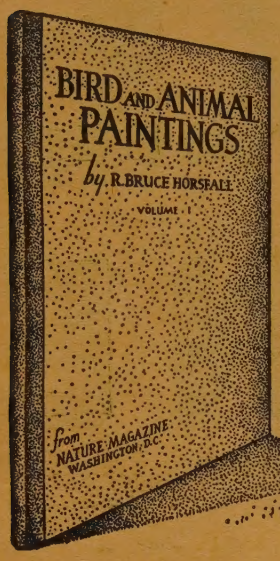
NATURE MAGAZINE

bruary, 1944 35 Cents Vol. 37, No. 2

A Useful Book for Home, School and Camp



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Have you not often wished for an accurate source of information about the name of a bird or animal or insect? On a walk, a camping trip, or while exploring new country, how often arises the question "What is it?" An animal flashing through the underbrush or scampering across the trail instantly arouses one's curiosity. For lovers of nature who wish to become familiar with the various species of wild life in this country, we offer a valuable aid and a genuine bargain in this book.

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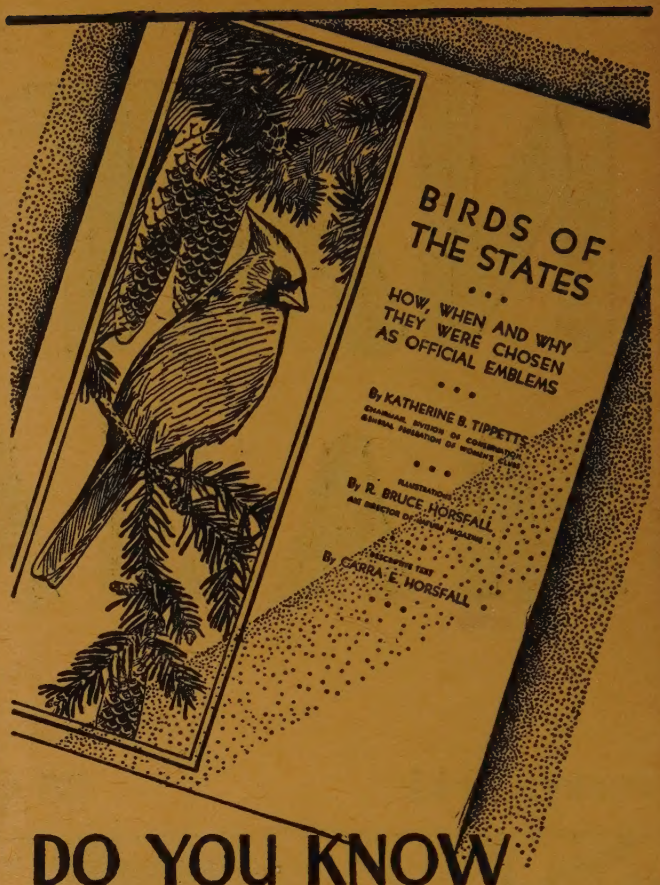
BIRDS OF THE STATES
HOW, WHEN AND WHY THEY WERE CHOSEN AS OFFICIAL EMBLEMS
By KATHERINE B. TIPPETTS
By R. BRUCE HORSFALL
By CARRA E. HORSFALL

DO YOU KNOW The Bird of Your State?

or of the 32 other states that have adopted official birds?

The movement to select an official bird emblem for every state continues. Thirty-two states and the District of Columbia have officially chosen bird emblems. Is your state included? This booklet will show you how your state stands.

The fascinating story of how, when and why the various states selected the birds to represent them is told in this book by Katherine B. Tippetts, former Chairman of Conservation, General Federation of Women's Clubs. Illustrating the book are 30 full color paintings of the various birds by R. Bruce Horsfall, the famous wild life painter, with descriptive text by Carra E. Horsfall.

Every home and every school should have this book. It is a fascinating bit of history combined with an authentic and interesting survey of the birds of America. A handy table in the front lists the birds together with the official flowers of the states.

The 16-page book, with 30 illustrations, is offered to readers of Nature Magazine at 25 cents a copy. On orders for ten or more copies, the price is 10 cents a copy.

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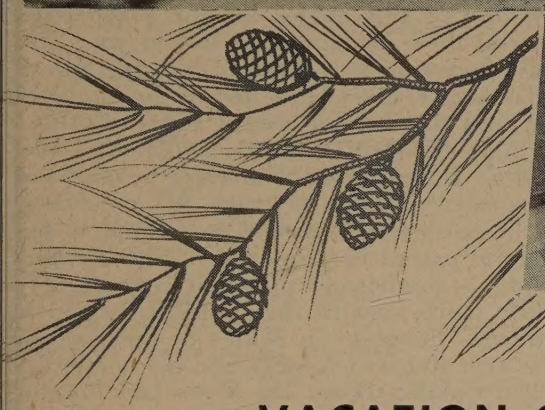

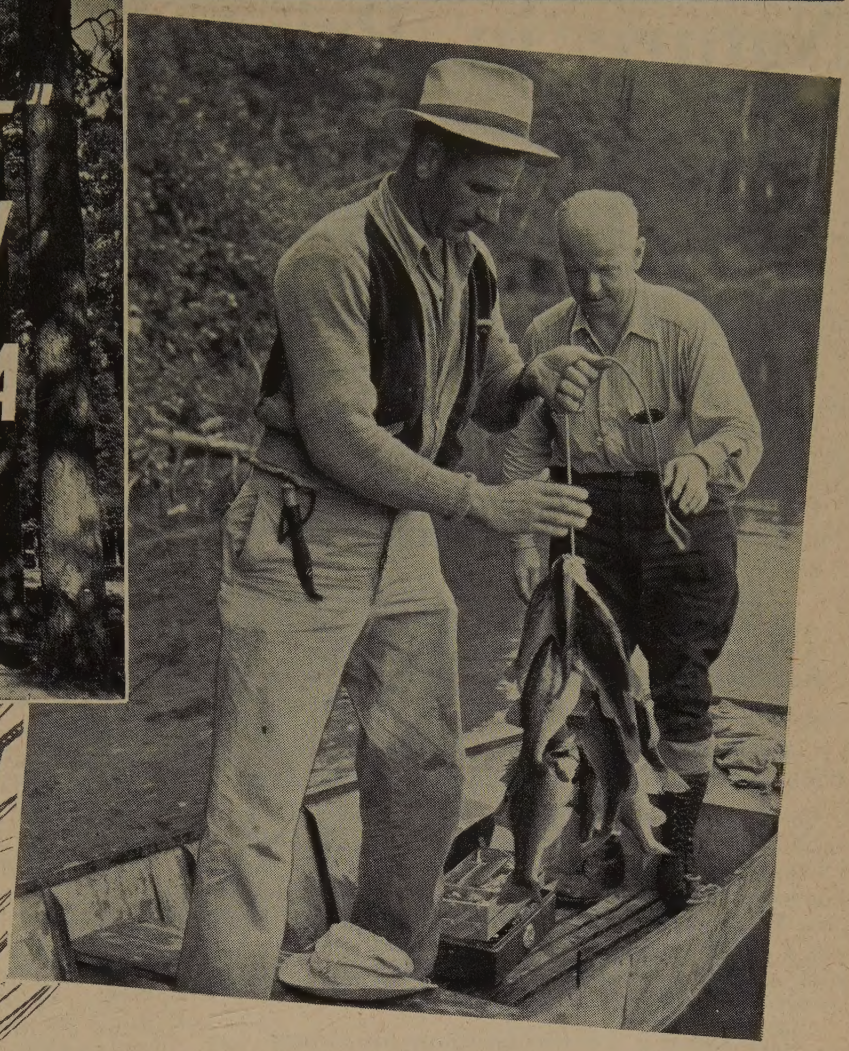

VACATION QUESTIONS AND ANSWERS

QUESTION: Is it patriotic to take a vacation next summer?

ANSWER: *Certainly! In fact Government officials recommend taking the right kind of a vacation.*

QUESTION: What is the right kind of vacation?

ANSWER: *One that minimizes the use of critical materials and vital transportation in reaching vacation spots . . . and the kind of vacation that will build you up and renew your energy for war work.*

QUESTION: What type of transportation shall I use?

ANSWER: *When the distance is not too great plan to travel by motor car, if your A card ration permits . . . and use B and C cards only as authorized. Use trains or buses sparingly on week ends. Cooperate with the efforts of your Government to maintain war transportation schedules.*

Of course, you can take a vacation this summer. You probably will need one more than you ever did in your life. Select a cabin in the woods. Stay put! Fish, canoe, sail and swim in the sky-blue waters of a Minnesota lake. This way you will not be using critical war transportation, but will be getting that much-needed change and rest. Let us help you now to pick that ideal vacation spot in the land of 10,000 Lakes.

Write to Minnesota Tourist Bureau, State Capitol, St. Paul, Minnesota.

Minnesota - Land of 10,000 Lakes

Nature in Print

By HOWARD ZAHNISER

THERE are no limitations on wartime excursions in an armchair—none at least that are more difficult than the simple problems of finding time for the armchair and choosing a suitable means of transport.

How about doing a thorough-going exploration of the Great Smokies and the Blue Ridge?

Have you ever been through that part of the British Isles where the Wye flows down from Wales to the Severn?

Or, how would you like to see the seacoast of New England and the mountains of New Hampshire with a poet who has

> . . . gathered beach plums on Plum Island,
> And blueberries on rock-ribbed Appledore,—
> And seen, along the winding Parker River,
> Salt haystacks rising from a level floor;

and who also has

> . . . skied on Washington's cold summit
> When snow squalls all but hid the Carriage Road?

Consider the New England possibility first. It is a volume of verse, competent verse, that is poetry too—a volume entitled *Granite Ledges,* by William Plumer Fowler, which includes a group of poems "On the New England Seacoast," another "Among the Hills," and a third "Further Afield." It is a volume profuse with sonnets by a craftsman who writes in one of them:

> The Sonnet is a mountain whose broad base
> Six centuries of poets have sought to climb.

Yet it also includes such satisfying quatrains as—

> High on a mountain brookside,
> White-throated sparrows sing
> In notes of clearest silver
> Borne on the breeze of Spring.

And six times Mr. Fowler uses an echoing verse form that is perhaps best heard in his poem "Lilacs":

> Wine-purple are the lilac flowers,
> And heavenly sweet the air! . . .
> In May's bright sun and gentle showers
> Wine-purple are the lilac flowers
> That thrill New England's waking hours
> While lilacs bloom aflare! . . .
> Wine purple are the lilac flowers,
> And heavenly sweet the air!

Lack of time need bother none of the prospective travelers on Mr. Fowler's transport. Long enjoyed, it is a volume soon read, and appropriately so, too, for as the book itself declares:

> Love is not measured by mere hours or days,
> Nor is the sunset's splendor weighed in time:
> No calendar can count, no clock appraise
> The pearls that sparkle in a poet's rhyme . . .
> How brief the flashes that make life sublime! . . .

The poet's wings of fancy are little like the commodious transport now offered for that first suggested exploration of those mountains far to the south of New England. So abundant are the choices when books are the offerings! *The Great Smokies and the Blue Ridge: The Story of the Southern Appalachians,* edited by Roderick Peattie, does in fact offer a series of excursions, each with a guide who has an eye for his own specialties. Donald Culross Peattie travels the mountains thinking of "Indian Days and the Coming of the White Man." Alberta Pierson Hannum tours the region with eyes—and ears—alert for "The Mountain People." Then Donald Culross Peattie returns for a travelog on "Men, Mountains, and Trees" and stays on for a look at "Blue Ridge Wild Flowers." Ralph Erskine tells of "Adventures Among the Mountain Craftsmen." John Jacob Niles discourses on "Folk Ballad and Carol." Then Ralph Erskine again comes forward to answer the question "What About the Climate?" And, doing so with the declaration, "Every Month Has Its Charm," he is followed by Arthur Stupka with a journey in time called "Through the Year in the Great Smoky Mountains National Park, Month by Month." Henry S. Sharp conducts "The Geological Survey," and finally Edward S. Drake deepens the determination that every reader has to win the war promptly, for he nonchalantly answers in detail the question: "How Shall I Plan My Trip?" Thus a mere prospectus of the contributions by the volume's many writers surely encompasses all that one could hope for, and to make clear the nature of this choice for the prospective armchair travel there remains only this to say: The volume is as interesting as it is comprehensive. There are three classes of readers interested in the outdoors who should find this volume useful and enjoyable: Those who have traveled in the Great Smokies and along the Blue Ridge, those who have never been there but expect some day to make the excursion, and those who never have seen and never hope to see these mountains except in print and in photographs (of which there is a collector's plenty in this volume).

Now finally there remains that possible excursion from Plynlimon Mountain in Wales to the Severn. It would be with Robert Gibbings and his delightful volume called *Coming Down the Wye.* And for the comfort of those who can not cross the seas in war times, and indeed for a great many of us who can never in any case plan an excursion so far from home, this can be understood at once: Even the trip in reality could not be a satisfactory substitute for a reading of *Coming Down the Wye.* For this is a volume rich in the personal reflections of a charming writer, and it is alive with engravings that are indeed vivid, touched each to life with an emotion that is its own means of communication between artist and reader, whether this emotion be that felt at the sight of a heron stalking through the rushes, a branch swirling in the current, a cataract leaping its ledge, or the cool interior of an abbey.

"The closer I am to Nature the happier I am," Mr. Gibbings confesses. "I love to be alone with the winds that come up from the other side of the world, to be alone with these hills, some of the oldest on our planet. I like to feel the seasonal rhythm, to be conscious of the rising sap in spring, the maturing of the growth in summer, the tonic of the autumn, the sleep of winter."

Yet, as might be expected, thus at home with himself in the outdoors, Mr. Gibbings is also quickly at home with other people, and his record of his descent of the Wye is also a record of the people whom he met and a recording of many incidents. Once lost for a time in a thick mist—"thick as a fleece"—he came at last to a shepherd's buildings only to be confronted with three dogs "prancing, leaping and barking around me as if they were heraldic lions rampant."

"Then a shepherd appeared, and at a word from him the fury abated.

"'Would those dogs of yours bite?' I asked, as gaily as I could.

"'Oh, they'd never hurt a sheep.'

"'I wasn't thinking of the sheep,' I said."

Coming Down the Wye is a book to be commended for its own sake, for it has a validity that is for its reader no longer dependent on the particular hills and valleys that were the scenes of its author's travels. It has been enjoyed in an armchair in Hyattsville, Maryland, with as much satisfaction as it could be in London, and with no discontent whatsoever with the distance between the Potomac and the Wye. It seemed all the more welcome in that Hyattsville armchair because there also William Wordsworth, across space and through time, had many times repeated:

How oft, in spirit, have I turned
to thee
O sylvan Wye!

"Lines Written a Few Miles Above Tintern Abbey, on Revisiting the Banks of the Wye During a Tour, July 13, 1798" have been lines read many times, and as to Wordsworth, who had seen

These waters rolling from their
mountain-springs
With a sweet inland murmur

and their "steep and lofty cliffs," so also to one who had never actually looked upon them

These forms of beauty have not
been to me,
As is the landscape to a blind
man's eye:
But oft, in lonely rooms, and mid
the din
Of towns and cities, I have owed to
them,
In hours of weariness, sensations
sweet,
Felt in the blood, and felt along
the heart
And passing even into my purer
mind,
With tranquil restoration:—feelings too
Of unremembered pleasure; such,
perhaps,
As may have had no trivial influence
On that best portion of a good
man's life;
His little, nameless, unremembered acts
Of kindness and of love.

It was on the banks of the Wye that Wordsworth made his declarations of faith

Knowing that Nature never did
betray
The heart that loved her.

Coming Down the Wye with Robert Gibbings is thus the rarest excursion of all for those who have already seen it with Wordsworth. It is a wonder that Robert Gibbings, visiting Tintern Abbey, says nothing whatever about Wordsworth and his lines written a few miles above. Perhaps he knew it was not necessary. Certainly the omission affects in no way what he *has* written.

It is the good fortune of armchair travelers that in considering the choices among destinations they—in their own fashions—reach all of them.

Granite Ledges: Sonnets and Lyrics, by William Plumer Fowler. Boston: Bruce Humphries, Inc., 1943, 63 pp. $1.50.

The Great Smokies and the Blue Ridge: The Story of the Southern Appalachians. Edited by Roderick Peattie. The contributors: Edward S. Drake, Ralph Erskine, Alberta Pierson Hannum, John Jacob Niles, Donald Culross Peattie, Henry S. Sharp, and Arthur Stupka. New York: The Vanguard Press. 1943. 372 pp., with 30 photographs on 17 plates, 3 text roadmaps, end-paper map by George Annand, "appendix of further reading," and index. $3.75.

Coming Down the Wye, by Robert Gibbings. New York: E. P. Dutton & Co., Inc., 1943. 189 pp. with 62 engravings by author. $3.00.

Our Living World

Our Living World. By Carroll Lane Fenton. New York. 1943. Doubleday, Doran and Company. 312 pages. Illustrated. $4.50.

This is a companion book, in a sense, for Dr. Fenton's *Our Amazing Earth*, which fascinatingly presented the story of geology in popular terms. In this latest book the author has treated the dramatic story of living things in the same effective manner. Starting with the simplest living organisms, he carries the reader to man, his migrations and progress, his impact upon other forms of life. While this is not precisely a textbook in the usual sense of the word, it is, in our estimation, exactly the kind of textbook that would make biology courses live and have significance. Yet it is also a book for the general reader, thanks to the faculty that Dr. Fenton so outstandingly possesses of presenting scientific facts interestingly.

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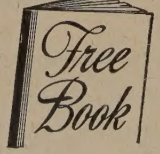

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LIST YOUR DOLLARS BUY WAR SAVINGS BONDS

Illustrated above is the new book, "The Human Eye in Anatomical Transparencies," published by the Bausch & Lomb Press.

His skill . . . and *your eyes*

The miracle of sight has intrigued the curiosity of scientists for centuries. Today, knowledge of human vision, of its deficiencies—and correction—is a mighty national asset.

There are certain facts about your eyes *you* should know, too. That a visual deficiency can seriously handicap your work and your life. That you aren't always aware of faulty vision until you've had a competent professional eye examination. That most eye difficulties can be corrected quickly, thoroughly, certainly.

There are men in your neighborhood who merit your confidence—professional men qualified by skill, training and experience to care for your eyes and those of your family. In their exacting scientific techniques they employ instruments of remarkable precision. And, when glasses are needed, they prescribe lenses and mountings that are in keeping with the quality of their professional service.

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This new resource is the research laboratory.

Today, in hundreds of industrial and college laboratories, trained minds are expanding the world's knowledge, and applying the results of research to industry and to war.

In the Bell System, research has always been a fundamental activity. The telephone was invented in a research laboratory. And for years Bell Telephone Laboratories has been the largest industrial laboratory in the world.

Underlying modern research is the realization of vast latent values in nature. Although the lone genius does from time to time bring to light some part of these hidden values, only organized scientific research can assure the thorough exploration that will render the full measure of use for human welfare.

Research means imagining and experimenting. It means the searching out and bringing together of facts. It means clear statements of problems, precise measurements and keen analysis. It means tenacious following along unexpected paths.

These are the procedures of research. Its consummation is the grasping by subtle minds of relationships in nature no one has previously known. And on the basis of the broader knowledge so established are built new materials, new methods and new structures to serve the people of America.

The Bell Telephone Laboratories has now concentrated its efforts on communication systems and equipment for the armed forces. When the war is over its researches in communication will again be applied to an ever-improving telephone service in America.

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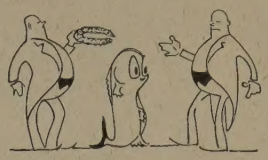
Contents Noted

We are taken to task in a postal card protest from a reader who identifies himself—or herself—only as "Decency Outraged." We are accused of being unmoral by publishing "Rima, the Capooa" in our November issue and thus condoning the purchase of the "seeing-eye" capybara from the old blind man. "Surely," writes our anonymous correspondent, "the writer could have foregone Rima until the old man had died." Being sensitive about the moral tone of *Nature Magazine*, we have read the story again, and it still seems to us, as it did in the half-dozen previous readings in manuscript and proof, that Mr. Sanderson did not want the animal in the first place, bought it only at the insistence of the old man, and tried his best to ease the old fellow's burden. However, differences of opinion make life interesting, and it is enlightening to note that we have had more requests for permission to reprint the story of Rima than we have had for any previous article.

Magazine and periodical publishers have received a pat on the back from WPB Chairman Donald M. Nelson for cutting their paper consumption eleven percent in 1943. This is one percent more than was asked of them, and was accomplished, he says, by "the same combination of ingenuity and cooperation which is accomplishing our war job." *But* the "shortage of pulpwood and wood pulp has become more serious," and a further fifteen percent cut started January 1. Okay, boys, run the WPB "C" for Cooperation to the top of the mast and let's go; we may be printing on birch bark yet.

Wandering up and down the Atlantic Coast for eighteen years, a scup has established new records. Back in June, 1932, this scup, then ignorant of fame that was to come, had a tag affixed to it by scientists at Woods Hole, Massachusetts. The tag was put on to give clues to migration habits as well as longevity. He was then seven years old. So the scup went his way, and eleven years later wound up on ice in a fish dealer's store in Fall River. His posthumous laurels are twofold—he was the oldest of his species recorded, and he beat by three years the previous record of a fish swimming about with a tag on him. A scup, if you do not know, is "a deep-bodied fish with reddish-brown sides and silvery underparts," and a common shore fish from Cape Cod to South Carolina. It provides about twenty million pounds of good eating a year.



It is mighty fine to see the recognition that is being given to Edwin Way Teale, author of the leading article in this issue. His "insect garden," which he described in our May, 1942, issue has paid handsome dividends. Three fine books have come from it, countless pictures taken there have been reproduced in leading magazines, and observations in the "garden" have furnished a large sheaf of articles. Most recently Ed and his bugs appeared in color in the *Saturday Evening Post*. Both Ed and the bugs were highly photogenic. He is a big fellow, built like a professional fullback and endowed with what appears to be unlimited energy. Whatever fame and fortune comes to him through his Nature writing and photography he has truly earned.

French used to be, and maybe still is for all we know, the language of diplomacy. Spanish, however, is the language of the Government plant explorers seeking fiber, medicinal and other plants in South America. Every specialist in our Department of Agriculture's division concerned with seeking out and introducing these economic plants has boned up on his Spanish, or gone back to school to learn it. Central and South America gave us the potato, tomato and hevea rubber plant, but is now yielding up still more botanical treasure. Some oilseed plants have been found with definite rubber possibilities, and one new discovery gives great promise as an addition to the list of green vegetables.

General Electric has taken the trouble to find out how much noise the rattle of a mature rattlesnake makes when in action. Close to the microphone it is 75 decibels, which, translated, is equivalent to the overall noise of a half-dozen typewriters in action. Quite a racket!

R. W. W.

Planting a new tree at the edge of the sanctuary at the Putnam Valley Central School. The sign at the entrance was made by the young conservationists.

Peekskill, New York, children create and derive a host of benefits from a—

Schoolyard Sanctuary

Photographs by the Author

By EDWIN WAY TEALE

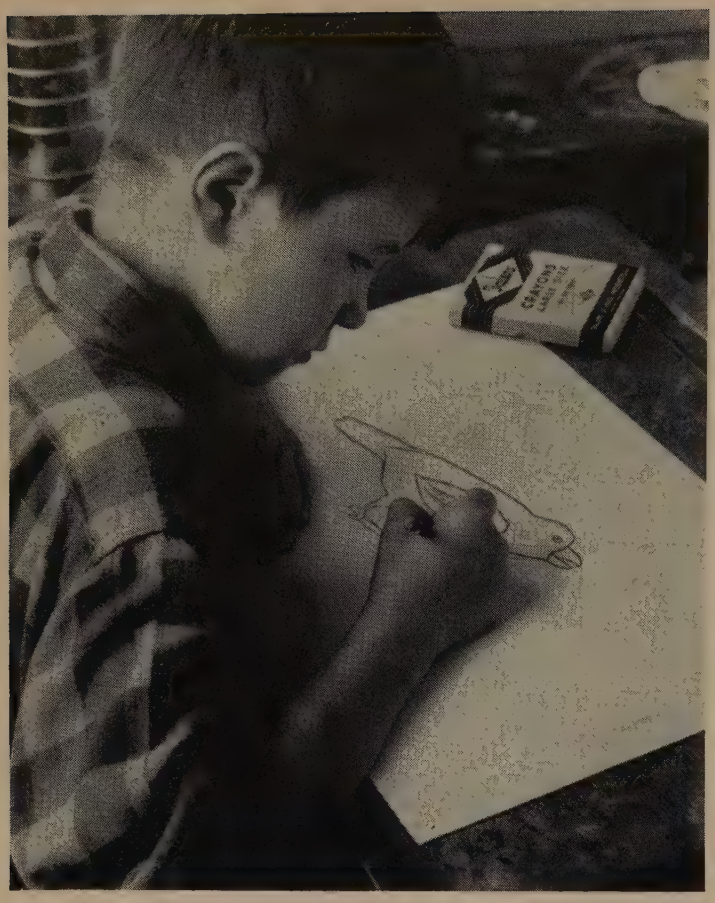
IN THE southwest corner of a country schoolyard, six miles from Peekskill, N. Y., a simple and interesting idea is proving an eminent success. It is a project that is applicable in thousands of schoolyards throughout the country; an idea of immense importance in the advancement of Nature study and conservation. This idea is the development of a miniature living museum and a woodland sanctuary created by, for, and of the children in the school.

Two years ago, Hilton E. Alexander, principal of the Putnam Valley Central School, inaugurated a landscaping program in which the children brought flowers and shrubs to plant in front of the school building. This led to discussions in class about wild flowers, particularly those that need special protection and should not be picked. So much interest was aroused that the offshoot of the discussion was a "wildflower museum" which would show the children the plants growing under natural conditions and would enable them to recognize woodland wildflowers at a glance. The site of this miniature outdoor museum is on the edge of a wood that forms the southern boundary of the schoolyard. The rest of this timbered tract has been left untouched, except for the cutting of Nature trails. It provides a natural sanctuary for native forms of wildlife.

For the purposes of exhibition and teaching, wildflowers have been transplanted into the small area at the edge of the wood. Feeding stations, bird-houses, birchwood benches and small Nature trails are part of this sanctuary-in-miniature. Most of the work was done by the boys and girls of the third and fourth grades under the direction of three teachers, Mrs. Hilton E. Alexander, Miss Doris Snowberger and Mrs. Harry Holmbraker. At first, when small parts of the underbrush had to be cleared away where too dense shade existed, boys of the sixth grade helped out. With frequent shouts of "Timber-r-r!", they chopped and sawed and thinned out a small area of the woodland tangle.

The younger children then added baskets of rich black loam, brought from the interior of the wood. Small granite rocks were collected and used to mark off trails that wind about through the midget preserve. Violets, and other woodland plants, soon were established in the loam of the area. About this time,

A walking stick parades on the sweater of one of the youngsters while the others study this strange insect, almost as strange as "Greedy," the praying mantis that answered the roll call every morning.



from sticks and from selected logs of birch.

To aid in the identification of plant and animal life, additional Nature volumes were added to the school library. By the time spring arrived, a schedule of "Things To Do" had been worked out, with the best time for doing each decided upon in advance. One of the first jobs was putting up a large rustic sign reading: "WILDLIFE SANCTUARY." It was created from pieces of birch nailed to a wide board that was hung by wires between two oak trees.

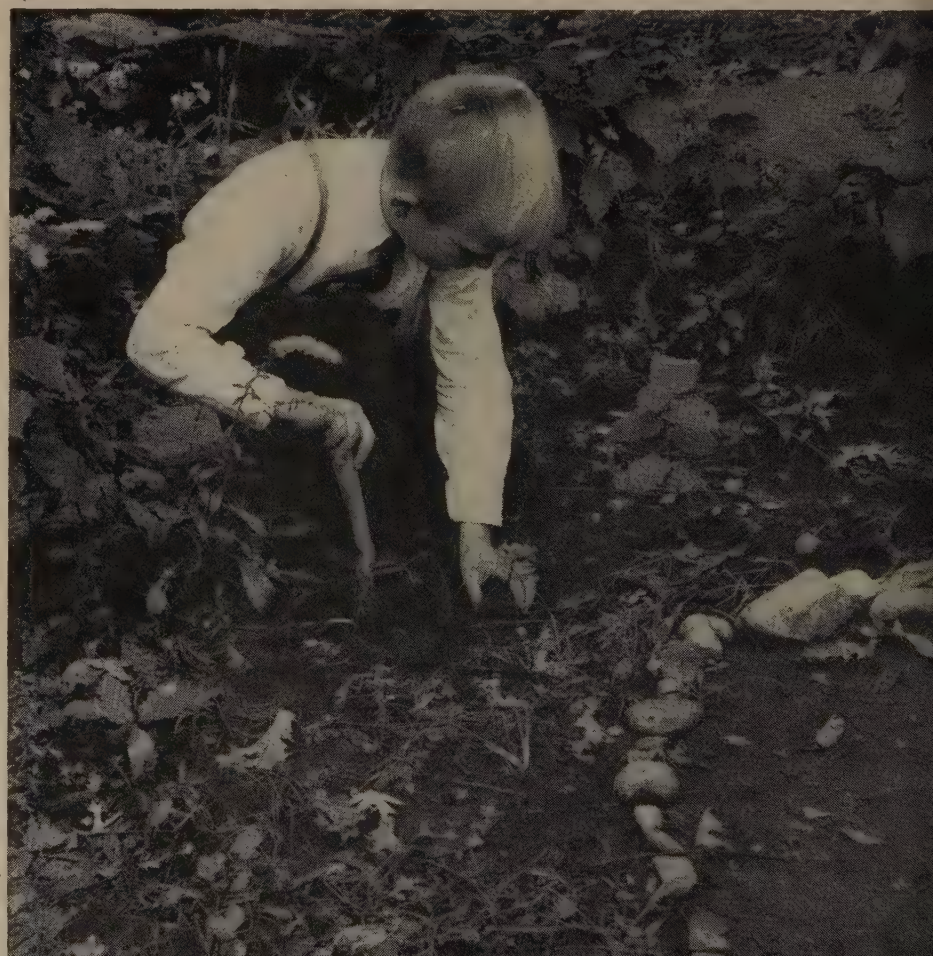
Since that day, steady progress has been made. Half a dozen bird houses, built by the children, have been put in place among the branches of the trees. New plants have been added to the sanctuary collection—lady-slippers, Jack-in-the-pulpits, wild geraniums, hepaticas, wild columbines, wood anemones, rattlesnake plants and various species of wood ferns. As the project has advanced, interest has spread outward from the school. A local florist contributed needed birch logs, and the community librarian suggested books that would be helpful. Children talked about the sanctuary at home and parents came to see it. Thus, the older people of the community, as well as the children, are being educated in the needs of conservation.

In numerous ways, school-work and the sanc-

Charlie VanTassel, who drew the cover for "The Garden of Thrills", the school's book about the sanctuary, works on a bird sketch. Below one of the boys carefully plants a wild flower in the rich loam brought for the wildflower garden. Stones mark the borders of winding walks.

a trip that the children made to the famous Trailside Museum, maintained at the Bear Mountain State Park by the American Museum of Natural History, supplied additional ideas for the growing sanctuary.

Work was begun in the fall, and a good start had been achieved before winter set in. Between autumn and spring, several meetings were held to plan what should be done when the snow melted and warm weather arrived again. Nearly fifty children from the third, fourth and sixth grades took part in these meetings and made their suggestions. Meanwhile, several of the boys were busy with saws and sandpaper, wood-burning instruments and varnish. In the school's wood-working shop, they produced artistic signs to mark the different species of trees found within the confines of the sanctuary. In the same shop, benches were produced

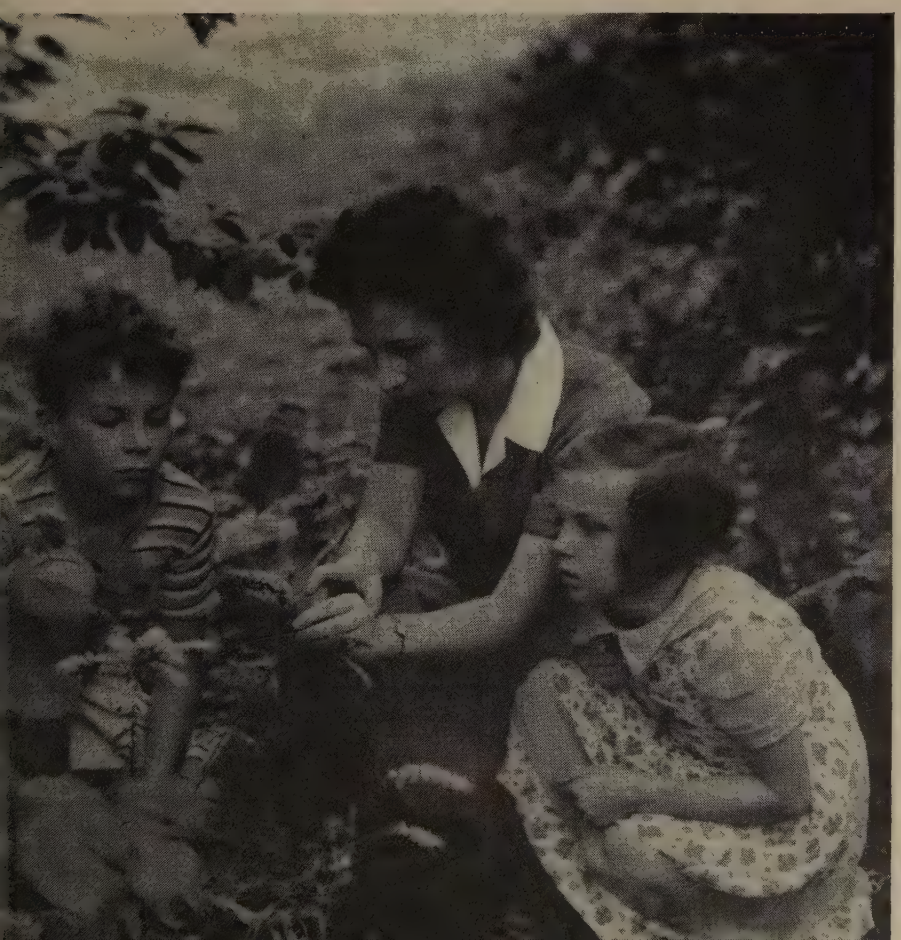


tuary have been linked together. In teaching science study, instruction in natural history is largely based on the wild life found in this fragment of woodland and the timbered area beyond. Spatter prints of leaves and drawings of flowers and fruits found in the area have been produced as part of this work. By spraying hot paraffin with a flit gun over fresh leaves, they were preserved in their natural colors. Now, two years later, such leaves have the appearance of having been just picked from their twigs.

Within the area of the sanctuary, pairs of towhees, scarlet tanagers, wrens and robins have built their nests. The home-life of the tanagers, which the children could observe clearly by sitting on the ground beneath one of the oak trees, provided a living serial story that continued from day to day. Another event in the sanctuary was the sudden appearance of thousands of winged ants from the decaying stump in which a colony had made its home.

Rabbits, chipmunks, gray squirrels and even a wild deer—which appeared at the edge of the woods one autumn day with its fawn—are among the animals encountered. Wood frogs and box turtles, tree frogs, garter snakes and salamanders, have put in an appearance from

Mrs. Hilton E. Alexander, whose leadership has been largely responsible for the development of the sanctuary idea, shows a wood frog to one of the young naturalists. Below, Miss Doris Snowberger conducts a little botanical investigation with a pair of interested children.



time to time. One tortoise became a special pet, occupying a terrarium in the science room. Another wild inmate of the schoolhouse was a praying mantis.

So hungry was this five-inch insect that it was given the name of Greedy. It ate whenever it was fed and consumed everything from grasshoppers to chicken livers. It was almost as thirsty as it was hungry and the children used to offer it drinking water several times a day in a teaspoon. They became so attached to the mantis that they insisted on Greedy being included in the daily roll-call. Another odd insect, which was encountered for the first time in the miniature sanctuary, is the froghopper, a curious sap-sucking bug that clings to the stem of a plant and covers itself with a white mound of bubbles that protects it from the sun and from its enemies.

Each fall, from the sanctuary

and from the surrounding trees and underbrush, the children gather the cocoons of the great silk moths, such as the Cecropia and the Polyphemus. They keep these cocoons in the science room over winter in order to watch the colorful emerging insects the following May. The egg-cases of the praying mantis are similarly brought indoors to hatch with the coming of spring.

Other classes than those in science have derived benefit from the school-yard-corner sanctuary. English and drawing had their day when the children of the fourth grade produced a twenty-two-page mimeographed "annual" to tell the story of the project. Called "The Garden of Thrills," it contains drawings and descriptions of the main flowers and birds found in the preserve, a record of the development of the idea, original poems by the students, and plans for the future.

Among the latter are projects for making a midget fish pond, additional birch benches, the planting of additional bushes and wildflowers, and a projected "track recorder"—an area of smooth, soft dirt that will record the pawprints of all the small animals visiting the preserve when night conceals them.

Mrs. Harry Holmbraker hopes no bones will be broken before the bird houses are safely nailed in sanctuary trees.

Approximately twenty-five children contributed either drawings, articles or poems to this book of the sanctuary. It was edited by one of the girls, Bonnie Lou Taylor, and the cover illustration was drawn by Charles Van Tassel. One of the included poems records the general attitude toward the sanctuary. It is entitled "Working in the Garden" and is signed: "Sue."

"We work and play
Through all the day.
We have lots of fun
In the hot, bright sun,
Where we get very dirty
And work until three-thirty.
We play with Ann and Jack
and Mary
In our wildlife sanctuary."

All in all, this small area at the Putnam Valley Central School has paid high dividends. The project has been neither expensive nor difficult. It is one that might be duplicated at almost any country school. Few things would contribute more to the cause of Nature-study than the swift spread of this idea and the appearance of similar schoolyard sanctuaries in all parts of the country.

In such a program are the fundamentals of conservation, a subject of vital importance to the nation's future.

★

To A Hawthorn

By EDWARD J. JOGUES

O beautiful shrub of the woodland—
A picture of grace and design;
I saw you today full of grandeur
In ermine-wrapped snow as a shrine.

In springtime I breathed your sweet fragrance.
In summer your shade I attest.
In autumn your fruit is a blessing,
And birds in your branches find rest.

Now, thanks be to God for such beauty
That stirs the emotions in rhyme.
Let's go to the woodland more often
To see such creations sublime.

Millions of years ago prehistoric ship worms ate into what is today—

Teredo Wood

By J. R. WHARTON

FIFTY million years old but still new—this is "teredo wood." This name has been given by mineral collectors to a type of petrified wood, which before being replaced by mineral had been bored full of holes by marine worms known as teredoes.

These ship worms, as they were known by the early Romans, are a type of mollusk. However, their shell is an insignificant part of their body. Some of these worms attain a length of five or six feet and a diameter of more than half an inch.

As larvae their young attach themselves to any wooden object found in salt water and immediately begin boring. Within a few months the wood is honeycombed with their holes. Although sometimes a hundred small teredoes enter one square-inch of wood surface it is said that one burrow is never found to break into another.

Millions of dollars in damage is done by teredoes to wharves, pilings, and other wooden structures exposed in harbors and bays. In years of light rainfall, when coastal rivers are low, the salt water penetrates farther into the mouths of these streams and brings with it the larvae of the teredo to prey on any unprotected bridges or other wooden structures. Such conditions caused damages of more than twenty million dollars in San Francisco harbor during a recent period of three or four years.

A five-hundred-pound specimen of teredo wood from an old sea-bed stratum in Oregon.

It is positively known that as far back as Eocene times, pieces of this worm-eaten wood sank into the sediment of the ocean bottom. Mud that contained the shells of many of the minute mollusks of the sea filled some of the holes vacated by the teredoes. Later, sections of these ocean beds were raised above sea level. The mud had been changed into rock. Pieces of the worm-eaten wood had been replaced by silica or other minerals in the process of petrification. Many worm holes that did not fill with mud were later closed with agate or were lined with crystals by the percolation of water carrying minerals.

Today this rare material can be found in old sea-bed layers hundreds of miles inland from the present ocean shores. In many cases these layers of strata are now crumbling shale, but the teredo-bored petrified wood is enclosed in limestone or sandstone concretions, which do not weather out like the shale itself.

Perhaps the reason for the wood being enclosed in a concretion is because the excess lime in the calcareous deposit surrounding many of the worm holes served to harden the mud out a certain distance from the wood itself. Many of these concretions are approximately the shape of the nucleus inside.

Associated with these teredo-bored wood concretions are many others with nuclei of shells of clams, oysters, small crabs, and any other object that may have had a tendency to harden the mud or attract the minerals on the ocean bottom. Some specimens with teredo-bored wood as a nucleus have, in the outer layers of the concretions, the shells of mollusks of different types. These definitely tie together the marine animal life and the tree plant life of the same period, millions of years ago. Some of the wood structure is well enough preserved in petrification to permit identification of the variety of tree.

Petrified teredo-bored wood, while considered very rare the world over and of much scientific interest, has recently been found in several of the western

states. Oregon seems to have the greatest supply, both along the coast and as far as a hundred miles inland. Specimens as large as 500 pounds in weight have been recovered for museums. A great many types of wood are represented. With the natural grains of wood showing in many specimens, and the white lining of the holes contrasted with what was once a mud filling, polished specimens of this material are interesting and attractive. Some have the worm holes filled with bright metal.

Students of chronology have records of tree-ring growth for some localities back for nearly 2000 years. Petrified teredo wood will open many interesting new fields to them, since the approximate dates of the tree growth are tied in closely with the marine life. Marine fossils are the best evidence that we have in making up the time-table of prehistoric times. We cannot expect to make a complete tree-ring record back to Eocene times, perhaps fifty million years ago. Still, the comparison of ring growths of teredo wood found in any prehistoric sea bed layer may bring forth some interesting facts. Did the yearly rainfall, for example, affect the tree ring growth in ancient times as it has in the last 2000 years?

Doubtless, geologists and other scientists must have seen this material and studied it, but little has been written about it. Within the past ten or twelve years increased interest has been shown in this type of prehistoric fossil wood. It is hoped that a complete study of specimens from the different areas will be made.

★

Snowfall

By ALLEN E. WOODALL

The beauty of the falling snow that comes
Unheralded by lightning, or the drums
Of moving thunder, but on silent wings
Flutters and drops to earth, billows and clings
To the rough bark of trees and gathers white
In crevices of roofs. The earth goes bright,
Silent and peaceful under skies of gray,
A glimmering canopy stretching away
To dim horizons. We no longer care
That earth has dropped a misty curtain there.

★

Intrepid Mothers

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Find the mother blue grouse on the nest that happened to be in the path of a logging operation in Oregon. Disturbed by the felling of the tree against the base of which she had chosen a nest site, she returned to raise her brood. Photograph by Paul Hosmer.

ALTHOUGH a logging railroad was built within fifty feet of her nest, and caterpillar tractors roared by, hauling out great logs, the blue grouse seen on her nest by the tree stump refused to leave, reports Paul Hosmer of Bend, Oregon. The nest had been built at the base of a great pine in the path of logging operations. It was so inconspicuous that the loggers almost stepped on it when they started to fell the tree. During that operation the mother left for the woods, but returned as soon as the fallers moved on. From then on she shared lunch from the pails of toughened old loggers until her eight chicks were ready to scurry into the underbrush.

That this intrepid mother grouse was no exception is indicated by a report from Fred B. Morrill of Spokane, Washington. Some mining development work was under way when a blue grouse nest was found under a small shrub and close to the spot where some surface rock blasting was scheduled. Workmen were told not to disturb the bird personally and the blasting went on, with the constant threat of destruction of bird and nest by flying rock fragments. Fate watched over the faithful mother, who stayed with her eggs. Then, one morning, workmen came on the job to find that the eggs had all hatched and the whole family had left the spot.

The ferocity of the bearded dragon is bluff, for it is practically harmless. When attacked, the jaws open wide, the spiky frill, or beard, is spread out, and the animal changes color, the body going from olive-brown to yellow, and the crossbars on its back from dullish yellow to orange. It grows to be about twenty inches long.

In Australia are found strange lizards with strange habits, the—

Survivors of the Dragon Age

By DAVID FLEAY

THE largest dragon in the world today, the Komodo dragon or monitor lizard, *Varanus komodoensis,* is a native of the islands of Komodo and Soenbawa in the Dutch East Indies. It is a member of the lizard family Varanidae, which is also well represented in Australia. This giant lizard, often fifteen feet in length, is rather a plain-looking fellow, entirely shorn of all projections and embellishments present on the conventional Chinese dragons. His Australian relatives closely resemble him.

The biggest, although least known of these, the perentie or printy, *V. giganteus,* inhabits the northern parts of central Australia and has been measured up to seven feet, two inches. There are reports that credit it with measurments of ten feet or more. One specimen was observed to catch and kill a partly grown kangaroo, while others have been known to knock aborigines off their feet with sweeping blows of their powerful tails, which they employ for defense.

The better known species in the southeast of the continent are the common goanna, *V. varius,* which is much at home in the trees, and the sand or ground goanna, *V. gouldii,* which spends practically all its time on the ground, using rabbit warrens as bases for hunting operations. The larger common goanna, known as the bungarra in western Australia, often exceeds six feet in length. When brought to bay, it makes a most ferocious display.

There is a common belief among bushmen that a goanna's bite never heals. However, I have an old scar on the back of my right hand that may be traced back several years to the time when a large goanna obtained a hold and hung on for at least four minutes in spite of having its tail twisted to persuade it to let go. Eventually the lizard and I parted company, although some of my skin and flesh remained in its jaws.

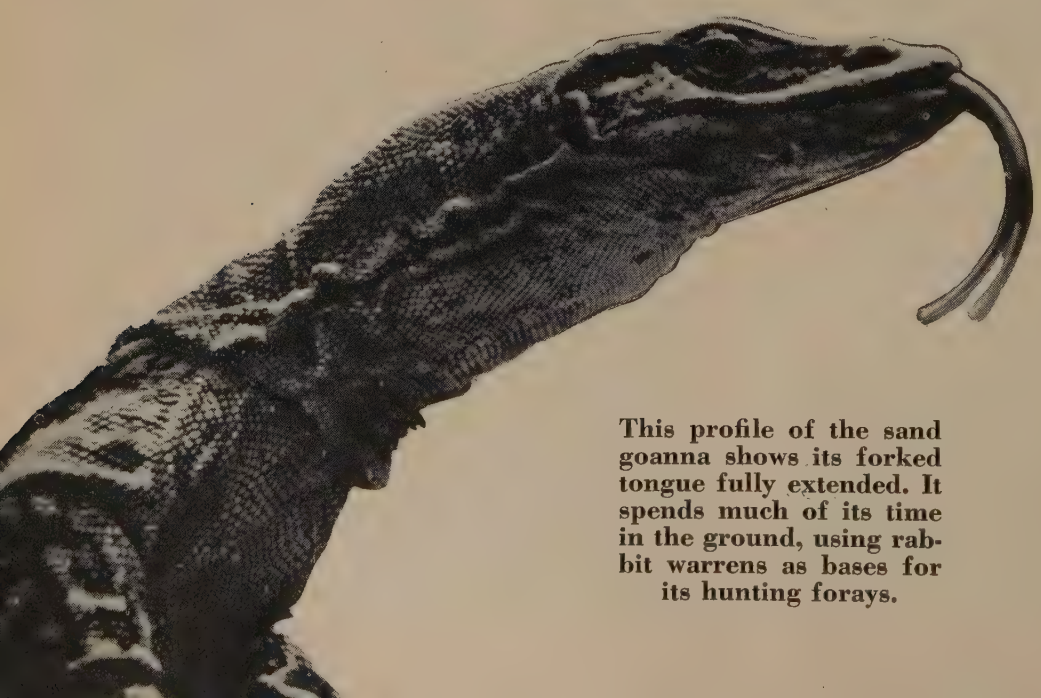
When the goanna is enraged it stands on its dignity while it utters fierce bellows with a hiss to them. These lizards often exceed six feet in length.

When pursued, these big lizards rush up the nearest tree in a spiral manner with a great clatter and rattling of claws on bark. When approached at close quarters, with no chance of escape, they inflate their bodies until the slack skin along the sides disappears, and the throat pouch swells enormously. Angry bellowing hisses are uttered, and the goanna's long forked tongue flickers rapidly back and forth. In addition, the tough whip-like tail is coiled ready to lash about with powerful stinging strokes. Last, but by no means least, it has "up its sleeve," as a trump card, that delightful little habit of disgorging its last meal, which may or may not have been carrion, over any intruder who is unwise enough to attempt an ascent of the tree in which it has taken refuge.

Of the five lizard families represented in Australia, one of the most attractive is the Agamidae, usually referred to by naturalists as the Dragon family. It includes the handsome water lizards, the Jew lizard or bearded dragon, and its many smaller and more active relatives. Among these is the fearsome-looking, although harmless, little *Moloch horridus,* or thorny devil, of the continent's arid inland regions.

The typical members of this family vary in length from the water dragon's three feet to *Moloch's* six inches. They have long slender tails and remarkably well-developed hind limbs. In fact, many of these lizards adopt a bipedal mode of progression when pursued, and race along with their fore limbs and head held high and clear of the ground. Another interesting characteristic is their power of changing the color of the skin according to the nature of the immediate surroundings.

The familiar bearded dragon, *Amphibolurus barbatus,* is well known throughout most of Australia, where it is frequently seen on sunny days sitting up on the tops of fence posts or stumps, watching for insect movements in the vicinity, and swiftly running down to snap up its victims. Its habit of flattening the body into a saucer shape, expanding the beard, lashing the tail from side to side, and fearsomely opening its wide yellow mouth, is a marvellous piece of bluff, well calculated to deceive the enemy. According to the background, the lizard may, for protective purposes, change the color of its whole body—in a quarter of an hour or less—from bright yellow to black.



This profile of the sand goanna shows its forked tongue fully extended. It spends much of its time in the ground, using rabbit warrens as bases for its hunting forays.

A smaller and active little cousin of the bearded

These spiny fellows are variously known as demon lizards, mountain devils or horned dragons. They grow to about eight inches, are chestnut-brown, and swoop up ants with sticky tongues.

dragon is correctly known as the common or tree dragon, *Agama muricatus.* It is widely termed "the blood-sucker" by country people, although where such a formidable name originated is a mystery. This reptile is common in southern Victoria. When cornered, it makes a brave display with gaping yellow mouth, and, if the opportunity offers, is capable of a sharp pinching bite. Another of its peculiarities is that of lying perfectly motionless, hoping to remain unobserved while awaiting a chance to dash for safety.

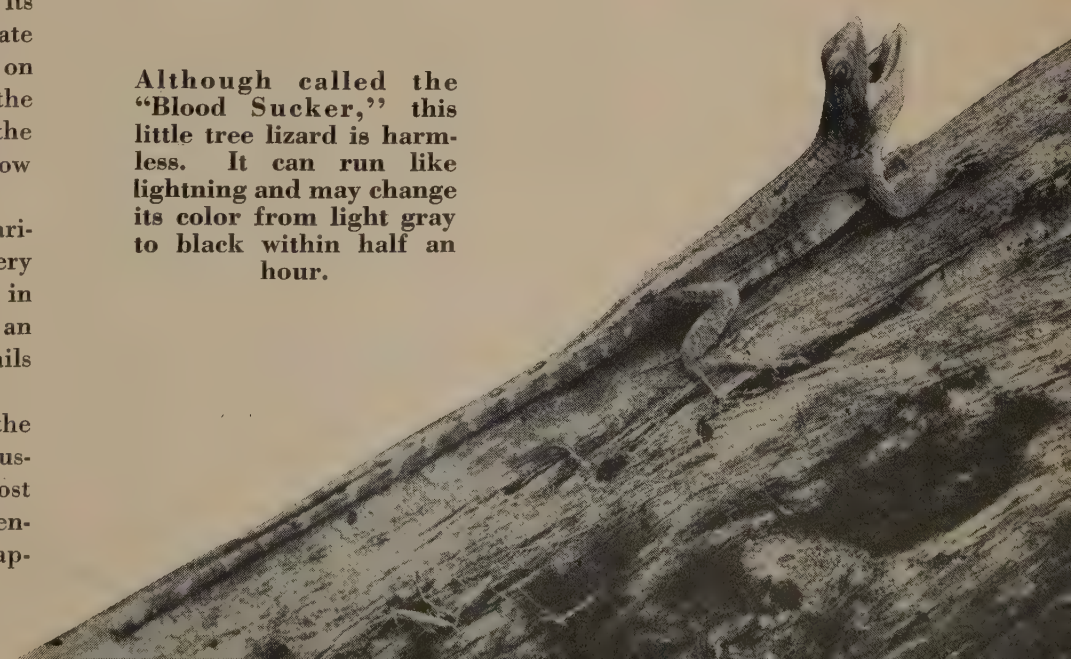
One of the distinctive members of this genus is the beautiful crested dragon, *A. cristatus,* whose range extends over western, central and south Australia. The low crest that runs along the neck and middle of the back is responsible for the name. This is one of the members of the family that often runs on its two long hind limbs. Referred to occasionally as the "racehorse lizard," this pretty fellow provides the aborigines with endless amusement, as contestants in races.

In dull weather, when the animal is sluggish, its general color above is dull brown with indistinct tail-bands; but on a hot day there is a remarkable change in its color and activity. The alternate dark and light yellow rings on the tail become pronounced, the body becomes yellowish and the head mottled, reddish-yellow and black.

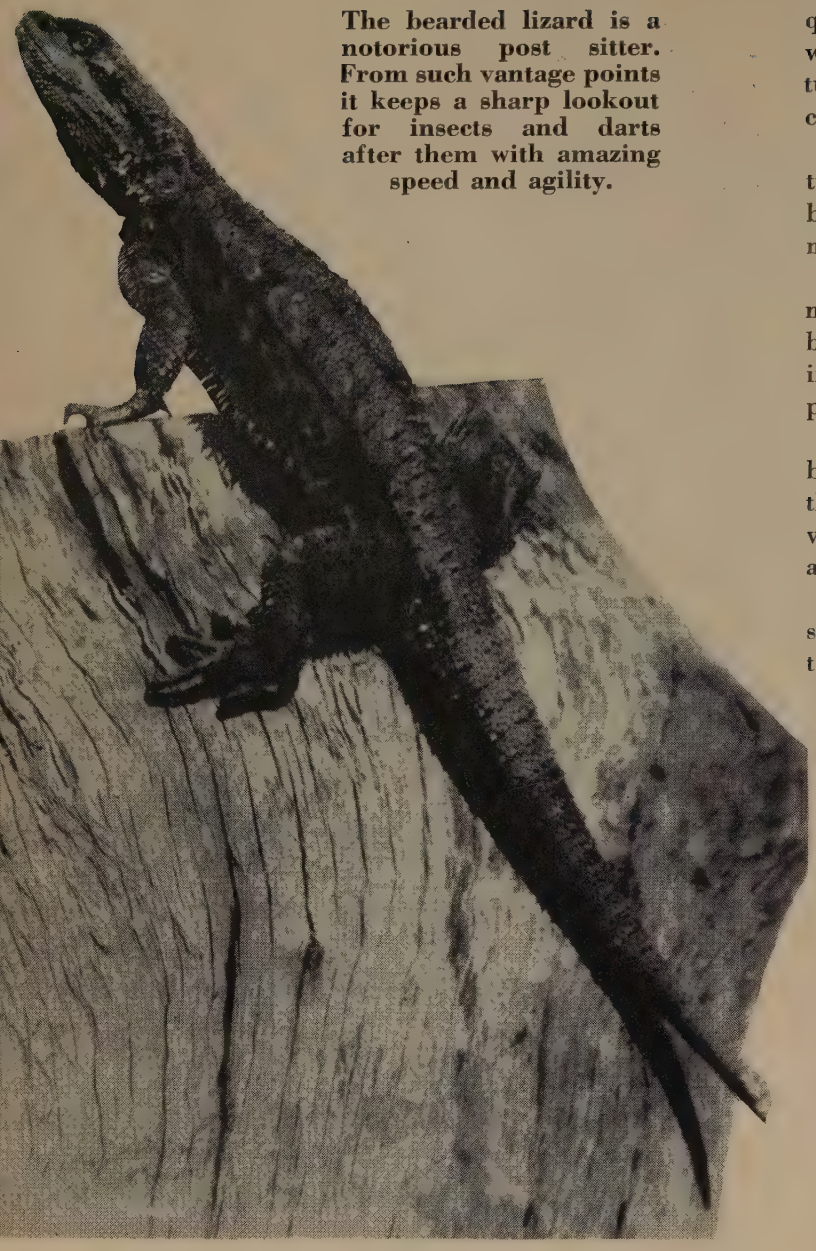
In central districts, the various dragon lizards are very brightly colored, especially in the breeding season, so that an ordinary picture naturally fails to do them justice.

The little thorny devil of the Nullabor Plain in western Australia is the smallest and most harmless of the lot, relying entirely on its extraordinary appearance and color camouflage for protection. It needs no weapons of offense as its diet consists of small black ants. Its head, body and tail are entirely covered with ridges of short thorn-like projections that are fleshy and not at all as sharp as they appear.

It would require a book to give any really comprehensive idea of the tremendous number of interesting lizards in Australia, varying as they do from the large goannas down to the legless lizards so closely resembling the snakes. For example, the family *Scincidae* includes the attractive little bronze or sun lizards, the rock lizards and blue-tongues. One of the best known of this family is Quoy's bronze lizard. He is a pert little fellow, well-known to trout fishermen along the banks of mountain streams, and to members of picnic parties, who feed him on crumbs. Fre-



Although called the "Blood Sucker," this little tree lizard is harmless. It can run like lightning and may change its color from light gray to black within half an hour.



The bearded lizard is a notorious post sitter. From such vantage points it keeps a sharp lookout for insects and darts after them with amazing speed and agility.

quently, when handled, Quoy's lizard sheds its tail, which performs the most extraordinary twists and turns, and acts as an excellent "sacrifice lure" in the case of encounters with birds.

Blue-tongues are large, heavy-bodied fellows up to two feet in length. They make excellent pets, their bright Prussian-blue tongues lapping up bread and milk in leisurely enjoyment.

Discovered in their native bush surroundings with no hope of avoiding detection, these lizards rely on bluff, gaping jaws and explosive hisses to scare the intruder. Their bites are as bad as a pinch from a pair of pliers.

Thrown on their own resources from birth, the baby blue-tongues are exceptionally pugnacious, and, although only three inches in length, they snap and hiss vigorously at all comers, and even fight savagely among themselves.

There is much of enjoyment and fascination in a study and appreciation of all these small survivors of the great age when huge reptiles dominated the earth and its waters. I, for one, find myself sharing many of their likes and dislikes. Who, for instance, would not prefer to sleep through the cold and drabness of winter and come out on those lovely later days to lie and worship at the shrine of the sun?

There are, of course, those who recoil at the thought of lizards, and other reptiles, having any beauty. Study and acquaintance, however, can usually change such an attitude. Added to that, it is necessary to realize that these animals have their important place in Nature's scheme of things. While many American boys who have been stationed in the land "down under" by the fates of war, may return home with nothing more to report about Australia's lizards than that there were a lot of them, others are finding relaxation in studying the "dragon" life.

★

Marbled Godwit

By LAURA C. WHITE

An oddsome bird the Godwit is,
God wot.
Ferned grot
He scorns for muddy pools;
And for his fishing tools,
One long and slender, upturned bill he's got,
With which to worry crabs and fleas—a lot.
He does not sing a sweet melodious lay,
But loudly shouts his name across the bay.
Krit! Krit!
God wit!
Its gay good humor fills each lonely spot,
And if you call it wild and harsh—why not?

One of the American cultivated heathers belonging to the genus *Erica*, closely related to the European genus *Calluna*. The heather here is *E. carnea*. Photograph from J. Horace McFarland.

Heather, Here and There

By MAUD MACDONALD HUTCHESON

"A GROWING affection for heather as a garden subject in America" was noted by Alexander Wallace when he wrote *The Heather in Lore, Lyric and Lay* nearly forty years ago. The affection is a deepening one, symbolized by that favorite of the florists' shops, cultivated heather. Growing taller than the "wild" variety, it is more fragile in appearance, the tiny pinkish bells swaying with moorland whispers.

Heath-er is thought to be the popular name of a plant that spreads in luxuriance over barren heaths, mantling waste lands with a wealth of green that flames into purple grandeur in the blossoming season. In the more erudite language of the botanist, however, common European heather is *Calluna vulgaris*, one of the large family Ericaceae.

Considerable mystery surrounds the existence of wild heather in the United States, for it has been claimed that "America has no native heaths."

According to Mr. Wallace, "Quite a stir was created in the botanical world when a plant of *Calluna vulgaris* in a pot was exhibited at a show of the Massachusetts Horticultural Society on Saturday, July 13, 1861." It had been discovered, growing wild, near Tewksbury, Massachusetts, by Mr. Jackson Dawson, later Superintendent of the Arnold Arboretum at Harvard Univessity. So enthused were the Society members over the find that on August 5 of that ominous year—the heather being then in full bloom—the flower committee was sent on an errand of investigation.

A bit of the pink heather that carpets the sides of Mount Rainier near timberline. Photograph by Asahel Curtis.

Half a mile from Tewksbury court-house the plants were spread over an extent of perhaps half an acre. "Suspicion" at first pointed to a certain Scot in the neighborhood—a Mr. Strachan—but when asked if he had imported plants or seed he pleaded "not guilty" to any such deed.

In submitting his report in the matter the chairman of the committee, Mr. E. S. Rand, concluded with this significant observation: "May not the heather once have existed in profusion on this continent and have gradually died out. . . .? May not this be the last vestige, or one of

the last, of what was once an American heath?"

Such general attention did the incident attract that *Vanity Fair* published an amusing cartoon showing the members of the Massachusetts Flower Committee searching for the heather.

"To many a mountain child the purple hillside is the only garden he knows, but what a garden!" Heather is not the national flower of Scotland, that honor going to the thistle, but the country's literature is rich in references to the heather-clad hills. Between July and October they seem to be on fire with a beauty that burns from pale pink to imperial purple.

But it is not alone for its beauty that heather is noted. Its economic uses are many and varied. Indeed, few plants have been put to, or are better adapted to, so many utilitarian purposes as this hardy heath-dweller. It makes fine cattle fodder, and has furnished the Highland maid and matron with admirable dyestuffs.

Thus did *Vanity Fair* picture the members of the Massachusetts Horticultural Society searching for heather near Tewksbury, Massachusetts.

Before the era of modern housing the crofters' cabins were thatched with heather and the walls of some of these simple dwellings were formed of alternate layers of heather and a sort of cement made of black earth and straw.

Then there is the heather couch, famed in song and story. It has ever been a favorite with the clansman, and the hunter, the shepherd, the tourist, even the botanist, have found it luxuriant when spread beneath the stars.

Heath, like pine needles, is abundant in healthful properties, for "being naturally a very great Drier, it doth exhaust superfluous Humours and restores Vigor to the Nerves . . . so that they who lie down in the evening faint, in the morning rise up nimble and sprightly." Thus does one old writer extol heather.

An advocate of its medicinal virtues is Dioscorides, who claimed that "the tender tops of the flowers are goode to be laide upon the bitings or stingings of any venomous beast."

The generic name comes from the Greek *calluno, to adorn, to sweep,* and heather is one of the best of brush makers. The larger stouter stems go into brooms; the shorter stems, tied into bundles, make all manner of brushes; the long tough trailing shoots are basket material.

Heather is an important contributor to the formation of peat, which is still largely used for fuel in districts where it is found. Peat, which is described as "vegetable matter decomposed by water and partly carbonized," makes a slow although lasting fire.

Devotees of heather honey would have it vie with that of Hymettus in sweetness, and as for heather ale—this potion has a place in historical legend. The early Picts are said to have made an "extra special" brew. The secret of its excellence has been lost, but the modern variety has been highly spoken of, too.

Heather to the Scot is as lucky as the horseshoe, and the two are commonly entwined on Christmas and greeting cards.

In flower lore white heather spells undying devotion. At Scottish weddings it plays a rôle of first importance. There simply must be a bit of white heather about the bride—holding her veil or tucked into her bouquet.

Through heather the national speech translates into highly significant idiom. "To set the heather on fire" means to cause trouble, as the clansmen were wont to do, while "to take to the heather" means to flee. It was in distant America that so many of the exiled Highlanders found welcome refuge in the long ago.

★

Bermuda (Pre-War)

By WALTER H. JACOBS

Verdant isles on a turquoise sea,
With coral beaches embracing thee;
Warmed in the arms of the Gulf Stream's flow,
Drenched with sunlight and moonglow.

Cedars guarding fast the shore
Where bays lie tranquil, or breakers roar;
White roofs shimmering in the noonday glare,
Scent of oleander on the fresh, clear air.

Ribboned with roads through scenic delight,
Bright greens by day, deep purples by night;
Caressed by breezes soft as a psalm,
Land of serenity, peace and charm.

Carson meadow mice of the species that was responsible for the costly mouse plague at Lovelocks, Nevada, in 1907.

A million mice a year from one pair provide an explanation of—

Mouse Plagues

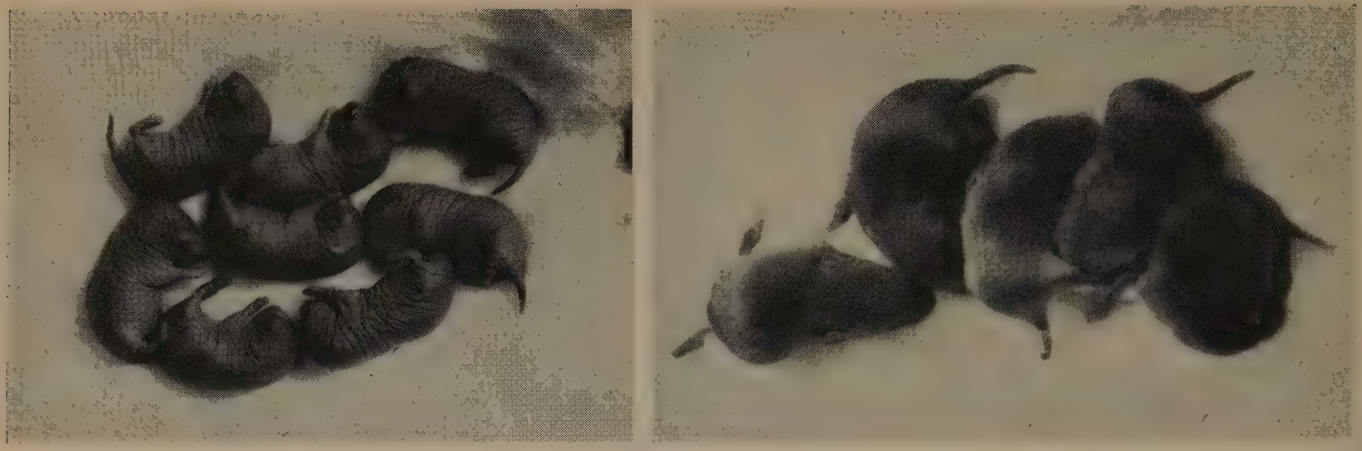
By VERNON BAILEY

Since the days of the Pharaohs, when clay Mouse Gods were set up to protect the crops from ravages of field mice, there have been Mouse Plagues in many of the Old World countries. Specific records of these go back for two thousand years. Many times hordes of mice have suddenly appeared and devoured every green thing over wide areas, leaving the people to starve. They were not all the Pied Piper kind of long-tailed house mice and house rats, but in the northern countries were generally the short-tailed voles, or meadow mice, of many different species.

The records of such plagues might also include the migrating lemmings of Scandinavian countries, which at times have become so numerous as to eat up all their food, and then move on in devastating waves until swallowed up by rivers, lakes, and oceans. Mouse plagues are usually local. They are of a serious nature for only a year or two, until the mice are devoured by their enemies, starve to death, or die of diseases at the climax of their abundance.

In this country mouse plagues are not uncommon, and some have proved very destructive of crops. A few have been carefully studied, and, in part, controlled by artificial means. Sufficient information is available, so we no longer attribute them to spontaneous or supernatural creation, sent as retribution for our sins, but we should recognize the fact that they are to some extent a direct consequence of our ignorant destruction of some of our most useful birds and mammals.

On November 6, 1907, while at San Francisco, I received a telegram from Dr. C. Hart Merriam of the U. S. Biological Survey, directing me to go at once to Lovelocks, Nevada, to find out what kind of mice had destroyed the crops in the Humboldt Valley, and what could be done about it. I reached Lovelocks next morning, went out to a big alfalfa ranch, and soon found out what was doing the mischief. There was no alfalfa in sight; apple trees and cottonwoods were bare of bark for six to eight inches above the ground; willows, rose bushes, currants, and even buffalo-berry bushes were peeled as high as the mice could reach. Gardens, grain fields, and potatoes were ruined. The principal crop of this big, rich, irrigated valley was alfalfa, which was not only eaten up, but the roots were eaten into the ground to a depth of six or eight inches. The surface of the fields looked as if plowed, and early in the morning swarms of meadow mice were moving over the ground, searching



Eight young meadow mice soon after birth. Naked, wrinkled, pink and blind, they are shown here about actual size. At right, five of this octet at seven days.

for food. Later in the morning, they retreated to their burrows where they gnawed deeper and deeper into the large, fleshy roots of alfalfa.

Practically all cover except the earth had been consumed, so the mice were exposed to a host of their enemies—owls, hawks, gulls, herons, ravens, crows, magpies, shrikes, coyotes, foxes, bobcats, skunks, badgers, weasels, and snakes. A flock of about two hundred California gulls were gorging themselves on the mice in one field every morning, then resting in the middle of the field until breakfast was digested, and repeating the gorge once or twice more before night.

The mice were recognized as a variety of the *Microtus montanus* group. They were big, furry, short-tailed meadow mice, dark gray or blackish in color, very simple in structure, tender and good food for all flesh-eating birds and mammals—in fact a favorite food wherever they can be obtained in abundance.

They had been increasing noticeably in the valley for a year or two, but during the spring and early summer of 1907 had swarmed in such numbers that the second crop of alfalfa was seriously injured and there was nothing for the third and fourth cuttings. The loss of crops in the Lovelocks area was estimated at $250,000, but no estimate was made for the whole Humboldt and Carson Valleys, to which the mouse plague reached.

An alfalfa field bare and full of burrows, showing what an infestation of meadow mice can do to a growing crop.

On receipt of my report at Washington, Stanley E. Piper, an expert in the use of poison, was sent to the Valley, and in cooperation with the farmers soon reduced the number of mice so the rest were eaten up by the birds and mammals that had collected from far and near to feast upon them. By winter, they were much reduced, and the following spring they were down to about normal abundance.

This is, briefly, the history of one mouse plague. There have been others, since and before, in different parts of the country. Such infestations can be checked, if recognized in the early stages, by simply clearing the fence rows and field borders, leaving open spaces where the owls, hawks, cats, foxes, weasels, skunks, and other mouse-eaters can get them.

Later, to get a better idea of how such plagues are possible, I caught a male and a female of our common eastern meadow mouse, *Microtus pennsylvanicus*, near Washington in April of 1922. They were given a comfortable cage with two nest boxes, an exercise wheel, a dish of water, and all the different kinds of food they might care to eat—green grass, clover, apples, potatoes, rolled oats, wheat, corn, bread, seeds of many kinds, and occasionally cooked or raw meat. Cantaloupe and green corn were greatly relished, but the mice were hearty eaters and few kinds of food were refused. They were not quite full-grown when caught, but grew rapidly and about doubled in weight during the summer.

They were friendly and lived contentedly together until the first young were born on May 25; then the male had to sleep in his own nest box and was not allowed near his five naked, pink, and helpless young in the soft cotton nest the mother had prepared for them. She was very devoted to them, and I had difficulty in getting the young away from her a few hours after they were born to weigh, measure and photograph them.

However, she left them long enough that first day

to get another family started without any waste of time, and twenty-one days later, when the first young were old enough to take care of themselves, and eat rolled oats, clover, grass, and seeds, a new family of six young were born. There was surprisingly little effort or inconvenience in the process. I watched them as much as possible, but they were deposited in the nest where I could not see very well. The mother would run into the nest box for a minute, deposit a young one, then come out and run vigorously on the wheel for a few minutes, then hurry into the nest, have another young one, and come gaily out for more exercise on the wheel. When I brought out one of the little wet, squirmy babies and laid it on some cotton in the cage, she rushed over and picked it up in her mouth, took a few more turns on the wheel, then carried it into its nest, added another to the rapidly-growing family, and stayed a while to lick and dry them off. It took something like half an hour to bring forth the whole litter, and an hour later she had still another family under way.

The male had kept discreetly out of the way in his nest box at the far end of the cage until the young were dried and fed and the female had leisure to think of other family duties. Then by some mutual understanding, call, or sign, they were together at frequent intervals for an hour or so, after which the male took no further interest in the family affairs until the next litter was born twenty-one days later. He was not aggressive and never killed or ate the young, as some males did later when the mother was away from home. He had a naturally good disposition, or had been well-trained at home, for the female of the species is determined and sometimes severe in her discipline. If the male ever oversteps the bounds of propriety, he is likely to pay for it with a bloody nose or a badly bitten ear or paw. There are also differences in the females, some gentle and quiet, others snappy and cross. Some of the males also are inclined to be vicious, picking fights, chasing the females, and even killing and eating the young if found unprotected. On a small scale there is plenty of variation and individuality, in so prolific a race, for rapid evolution. By careful selection, it would be an easy matter to establish in these animals gentle or savage strains, or to fix or eliminate any desired characters.

This rate of breeding continued for more than a year. A family of six, seven, or eight young was produced every twenty-one days with two exceptions. These were when the male was not in the cage with the female when the young were born. Had it not been for these delays, there would have been seventeen litters of young in a year, averaging about six to a litter, or one hundred two young from our female meadow mouse in a year. But that was not all. The young were about equally divided as to sex, and the young females had their first babies when forty-five days old and about half grown. The young males did not attain sexual maturity until forty-five days old, so the females began breeding with older males, not born in their own litters.

One young female from the first litter of the original pair produced thirteen families of young, totalling seventy-eight, before she was a year old. Others increased at the same rate, and their young followed suit. I did not keep all of them, as there was not room in my murarium, nor in my back yard, for the million or more meadow mice I would have owned if they had all lived and done their best to replenish the earth.

I did, however, demonstrate fairly well how a mouse plague is produced. If a pair of meadow mice to an acre, which is not an unusual normal abundance, produced a million of their kind in a year, there would not be enough grain, grass or alfalfa to feed them on that acre. That is just what happened in Nevada. Alfalfa is a favorite food. It grows rapidly, and, when cut, quickly produces more food and cover. Thus the mice are safe most of the time from natural enemies.

Meadow mice seek cover, live in shallow burrows or in their surface nests, and run in little roadways or runways they make, under the grass, leaves, or crops, to keep out of sight from their enemies. Their runways are often extended from marshes, pastures or weed patches into the fields as soon as growing crops afford food and cover. Dense growth is the safest protection they can have. They are not so likely to get into the fields with clean borders, and if they do, many will be picked up by birds and mammals as they dart in and out. Cultural methods, plus protection of natural enemies, usually control them.

Extermination of these rodents would be as impossible as it would be undesirable. They have a definite and critical place in the scheme of Nature. They are the most important food supply of owls, hawks, foxes, skunks, weasels, and many other animals that are of value when well fed but a menace when hungry.

After Eden

By ULRICH TROUBETZKOY

It is not wisdom in the feathered skulls
But the blood's purpose governing the wing
Of phoebes flying south and shrieking gulls
Fled in from storm. The thrushes only sing
The melodies of their inheritance.
Brooks find their level and the stars obey
The rhythmic urgencies of space. A tree
Sun-slanted and a flower turned to day
Observe their inner laws of chemistry.
Bears sleep through snow and beavers learn to build,
Deer leap, snakes coil to strike, but not with thought
Are they instructed in these ways and skilled.
By cellular compulsion they are taught;
Man only, after Eden, lone and strange,
Discovered laughter and has dared to change.

Our most abundant fur bearer, its tasty meat is ample reason for putting—

Muskrat on the Menu

By CLAIRE DUMOND

"WHAT'S this—something new?" I inquired of the head of the Nature Study department as I came into the laboratory.

"It's a muskrat!" said my superior. "The gardener found it on the campus this morning. Won't it be wonderful for the children in the Training School?"

"They'll love it," I replied. "I needed a new pet for them. It's time to release the flying-squirrels and screch-owls, and the chipmunk has spring-fever."

We approached the cage where a furry brown animal huddled in one corner, his shoe-button eyes staring watchfully.

"Isn't he a beautiful thing! What shall we feed him?" I asked.

"I've ordered lettuce, carrots, and spinach sent out from the store. He's a vegetarian, so that ought to please him. As soon as they come I wish you'd give him some. Get him as tame as you can before we take him to the children," and with that she left to meet her first class.

Feeding the muskrat was not a simple matter, however, and I began to get an inkling that here was one animal that would not visit the Training School. As soon as I opened the cage he lunged at me swiftly, baring his curved yellow teeth, and trying to bite my hand. He barely grazed the skin, but when I saw him rip carrots into shreds and fling them about the cage I realized I had had a narrow escape.

We named him "Groucho," and eventually figured out the proper strategy to use in feeding him. While one person held his attention by moving fingers against the wire on the far side of the cage, the other conspirator popped Groucho's vitamins in the door in a lightning-fast move. Since he was not good exhibit material, we let him go back to Nature after a short time, and as he waddled awkwardly away we heard him muttering unmentionable things under his breath.

Muskrats are sometimes found wandering through the fields and along roads in the spring rainy season, even appearing along city streets. After caring for several, I can truthfully say I have never found one with an amiable disposition.

Several years after my first encounter with a muskrat, my husband brought home a package from the office and presented it to me.

"What is it?" I said, puzzled at the contents.

"It's muskrat meat. One of my friends brought it to me to try. He said it makes wonderful eating."

"Shades of Groucho!" I (Continued on page 108)

Really no rat at all, the muskrat's name has been the principal reason for preventing people from trying it as food. As such it is delicious, requiring no ration points and salvaging meat that is now largely wasted. It may be prepared in various ways as addition to the menu.

This is the twenty-eighth in Nature Magazine's series of educational inserts.

Your "Yarb" Garden

By E. LAURENCE PALMER

Illustrated by Elizabeth Burckmyer

SAGE

FENNEL

HENBANE

The response to an earlier insert in this series, dealing with the spirit behind a private flower garden that was kept up simply for the love of it, was so gratifying that another garden number seemed desirable. Readers of these inserts asked for it. Here it is.

THE earliest recollection of many of us may be associated with some product of a "yarb garden." A popular uncle may have slipped us a bit of "pep-mint" candy when the usual supervisor of our meals was not looking. As we grew older, we began to explore our environment a bit ourselves; to nibble something here, lick something there. Not infrequently we gorged ourselves on fruits in varying degrees of ripeness, growing on property of varying degrees of abandonment. What our alimentary tracts experienced in those days would put us to bed in a hurry now. But we learned something we always remembered.

I could go blindfolded to the patch of spearmint back of my grandfather's house, where my mother first showed me how good the leaves were sandwiched between thin slices of bread. I remember the first time she got me to grub up and nibble the underground parts of dentaria—which she called "crinkle-root"—and of wild ginger, whose name she did not know.

I rarely visit the Cortland State Teachers College but I see in its spacious front lawn a vision of the old tumbledown cabin, maintained there when I was a boy by a mysterious but kindly old Negro ex-slave who showed me how harmless red-bellied snakes were, and who also told me when I sought snakes not to bother the patch of "yarbs" he had in the little garden he managed to maintain.

The only books on herbs available to me were the patent medicine almanacs—the reading of which "scared the tar out of me"—and a collection of silly poems about wild flowers that the teacher got out each Arbor Day, and from which she assigned us individual verses to learn for "the exercises". I classed the poems with the "piece", "Dancing Daffodils", which the piano teacher made me learn instead of "In the Shade of the Old Apple Tree", which he forbade me to learn.

As time passed, some of us may have come to make a living from herbs, as doctors, chemists, merchants, gardeners, explorers, collectors, or even as writers or professional botanists. Others follow the herb interest as a hobby. Some of the hobbyists get more fun from their interest in herbs than others gain profit. Herb gardening is a gamble, so if you cannot stand a loss, and do not get fun from "fooling with plants," you might well think twice before getting too interested in your dream garden of herbs.

As with other gardens, herb gardeners may specialize in cer-

BELLADONNA

CORIANDER

JIMSON WEED

CASCARA

CHAMOMILE

tain plants, or in certain groups of plants, or they may plan to produce a great variety. If the garden is to be carried on as a business venture, and there is an assured market for the product, there is a tendency to specialize in those plants that will bring the greatest financial return. If the garden is used to raise plants for home consumption it is likely to be more general. There may be plants raised because of their fragrance, flavor or for the supposed medicinal properties they possess. Most of us do not raise spearmint, horseradish, parsley, sage, caraway or even rhubarb because of any great amount of nourishment we may expect to get from them. Neither do we raise them for their beauty. Yet, I doubt if there are many long established home gardens that do not have one or more of these plants growing tucked away in some corner.

In the days before advertising convinced many that the way to be attractive to the opposite sex was to douse oneself with some *eau* that cost five dollars an ounce—and was produced for infinitely less—we had "yarb" gardens that produced love potions and the like for little or nothing. Macbeth's witches brewed "slips of yew sliver'd in the moon's eclipse" and "root of hemlock digg'd i' the dark", mixed with various animal ingredients to the tune of a mewing brindle cat and a whining "hedge-pig". Marco Polo's gift of musk to civilization is useful in blotting out body odors, much as onions in hash are useful in masking the odor of tainted foods. But odors, undoubtedly, do more than this. Dogs are not the only animals in the world that are led about their environment by their noses. Disgust, pleasure, fear, passion, hunger and thirst are undoubtedly stimulated by various odors, some of which may originate in anyone's back yard herb garden.

Pennyroyal, sage, anise, coriander, lavender, sweet grass, balsam and fenugreek are only a few of the plants whose leaves, seeds, fruits or other parts are used to impart a fragrance otherwise lacking. Not all of these are equally satisfying. While some persons like pennyroyal, others despise it, much as some like onions and garlic while others do not. So universally are some fragrant plants used in various businesses that they give many a place a characteristic odor. Bake shop, drug store (of the old-fashioned type that used to sell drugs), barber shop, dentist's office and hospital—each has its own odor. Some are studied and others are incidental. Each is real. The horse stable, the cow barn, the pig pen, and the chicken house—each has its own odor, although not of the alluring variety. Instead, we seek the odors that are commonly associated with luring some insects to some flowers, or even to animal scents that are useful in bringing the individuals of a species together. The use of scent to hide filth, or otherwise to deceive, has made its presence a source of suspicion, and, while many people add a gentle scent now and then to the coat lapel or handkerchief, it is hard to beat the good clean smell of freshly-cleaned things. Even here, scent may creep in because many toilet soaps are made fragrant with peppermint, wintergreen, anise or pennyroyal oils.

HOREHOUND

Just as a scent is important in itself, so fragrant things frequently figure in improving the palatability of many foods. This is particularly true of foods that would otherwise taste flat, as, for example, unseasoned pork. Imagine what sausage would be without sage! Curries, condiments, epicures, gourmands, spices—all are terms that we associate with what Rupert Brooke called "many tasting foods" that are anything but insipid.

ANISE

It is true that civilized people have been in the habit of looking to the longest settled parts of the earth for their spicy foods. Some of the plants that produce these foods have moved with men into more recently developed areas, but many things that pep up our meals still come from the remoter portions of the earth. In many cases this is unnecessary, because plants like anise, mustard, celery, coriander and sage are grown successfully in our own climate. Some evidence of the extent to which we have imported these cruder drugs and spices appears in the following figures—in pounds—for 1935:

HORSERADISH

Anise, 490,627; capsicum (pepper), 1,611,654; caraway, 6,168,202; cassia, 10,093,196; celery, 1,444,022; coriander, 1,618,322; fennel, 310,989; fenugreek, 511,732; mustard, 8,796,441; sage, 1,446,143.

Possibly the most interesting commentary on these figures is that the capsicum is a native American plant whose products we now import, just as most rubber comes from American plants grown in Asia, whence imports are temporarily suspended.

Take a look at the gum counter the next time you are in a store—or recall it from pre-war days—and see how

SPEARMINT

PENNYROYAL

FOXGLOVE

PEPPERMINT

FENUGREEK

many different flavors are there represented. Clove, spearmint, peppermint, wintergreen, anise are some of the gum flavors, while cherry, lemon, lime, cinnamon are in the candies that, like the gum, are supposed to help flavor your breath, whiten your teeth, provide you with the necessary vitamins, and, in general, make a new person out of you, if you believe the advertisements. Not a few of these flavors are produced in the gardens of our country. Many more could and should be.

The bakeshop with its rye bread with caraway and its hard rolls with poppy seeds; the restaurant with its shakers of pepper, celery salt, the horseradish jar, and other peppy substances; the grocery, with its spice counter, all offer markets for the raiser of these substances if the drug store fails in what it pretends to be. It pays the bakers and restaurant keepers to feed their patrons things that stimulate the appetite.

Not a few herbs are used for food and drink, but these should, for the most part, be considered in a later number of this series. In the good old horse and buggy days, we used more chicory in our coffee than now. With rationing, we may resume using the roasted roots of this herb to stretch the number of drinks allowed us on our ration coupons.

The good old medicine man, like some of our great grandparents, got healing materials from the fields, woods and streams. All sorts of reasons were advanced to explain why a given plant provided a suitable cure for a given disease. Plants that looked like the heart were believed to be so shaped by the Deity to indicate that they should be used in treatment of diseases of the heart. Those shaped like the liver were for the liver, and so on. This philosophy was carried to such extremes that plants that bore tooth-like projections were believed to be useful in curing dog bite, and plants that were yellow were believed to cure yellow jaundice. This rule was extended to apply to all sorts of organisms, one prescription for using lichens in curing dog-bite specifying that after taking a dose of a given lichen in warm milk "four consecutive mornings", the patient "must take a cold bath every morning for a month, and for two weeks subsequent, a bath three times a week". One might assume from this that the taking of a bath more frequently than each Saturday night was considered a severe punishment. Certain it is that much of the treatment of disease employed the use of evil-tasting potions, possibly with the idea that the patient would strive to get well to escape further torture. As the years have gone by, many of the old-time cures have dropped out of the official picture, although they have continued to have supporters among the less-informed groups. A glance at the chart section of this insert will show some stock remedies that relatively recently have lost official support by the medical profession.

WILD SENNA

CARAWAY

Before World War I, we in America had been rather thoroughly dependent on Europe—and particularly on the self-styled "master race"—for advice on medical matters, as well as for materials that were used by the medical profession. Our inability to get from Europe certain chemicals useful in the treatment of disease created problems. Chemical leaders solved this in part by cutting red-tape and by sponsoring American production of materials formerly produced only in Europe. Some of these materials were useful in commerce and the arts, but many of them were useful in medicine. Some of them represented synthetic substitutes for materials formerly gathered from plants or animals.

During the rest period between the two periods of world-wide insanity, we gradually shifted responsibility for raising some things essential to our way of life to nations whose living standards were lower, and whose production costs were such that we could not offer effective commercial competition. We imported great quantities of plant products from parts of the world now closed to trade. Many of these plants could just as well have been grown here.

With the advent of World War II, we found rubber, many fibers, and plenty of other products no longer available from West and East. This situation has sown seeds of determination on the part of many Americans that never again will we be faced with the necessity of going to war partly because of dependence on other parts of the world for materials that we can produce in the Americas. Some of these materials will be produced in tropical America, but many can be grown in the gardens and on the farms of the United States and Canada.

Among the things that we can raise but which we have commonly imported, and for which there is likely to be a dependable market even after the war, are anise, belladonna leaf, belladonna root, caraway, coriander, digitalis, (Continued on page 88)

COMMON NAME SCIENTIFIC NAME	HORSERADISH *Armoracia rusticana*	WILD SENNA *Cassia marilandica*	FENUGREEK *Trigonella foenum-graecum*	SAGE *Salvia officinalis*
DESCRIPTION	Height, to about 3 feet. Lower leaves large, oblong, long petioled, wavy-margined. Upper leaves without petioles. Stem bearing flowers, much branched. Root woody, much branched, deeply penetrating, perennial, long-lived, pungent, white, with a biting taste, easily scraped into fibrous, juicy material.	Height, to 6 feet. Smooth, or nearly so, with relatively unbranched stems. Leaves light green, with a large raised gland at base and upper side of each petiole. Leaflets 8 to 10 to each leaf, narrow, pointed at tip, smooth, 1 to 2 inches long. Leaves and leaflets in varying positions at night or day, or in dry or moist weather.	Height, to 2 feet. Stem usually unbranched, fuzzy, heavily scented, erect. Leaves of 3 leaflets, much like the commoner clovers but with indentations near the tip obscure. Leaflets ¾ to 1 inch long. Root rather deep for an annual.	Height, to 1 foot. More or less white-woolly and somewhat shrubby. Leaves opposite, entire, long-petioled, the lower, white, with abundant wool beneath, to 2 inches long, roughened, with rather conspicuous veins. Plant appears to be an irregular mass of ascending stems springing from a more or less common root base.
RANGE	Native of Europe introduced into America and rather widely established here both in and outside gardens. Cultivated sometimes on large scale both in Europe and in America. Best in moist ground and is often planted in wetter spots of gardens where most garden plants would not thrive. Cultivated some 2000 years.	From New England south to Carolinas, growing generally in richer soils. Yields to cultivation and is rather widely grown in herb gardens. In middle West is cultivated on commercial basis. Indian senna, *C. angustifolia,* and Alexandria senna, *C. acutifolia,* are cultivated also. Former cultivated as Tinnevelly senna.	One of some 70 species mostly native of Old World and Australia. Native of southern Europe and Asia; little grown in America but commonly cultivated in southern Europe. Grown for flavoring in India. Name Trigonella means "little triangle" and refers to general leaf pattern. Best on well-drained loams. Poor on clay, sand, wet or sour soil.	Native of southern Europe where, in Dalmatia, it is raised extensively. Found throughout Mediterranean region and has long been naturalized as a garden plant in America. Old home remedy plant and responsible for the saying, "How can a man die in whose garden sage is growing?" Does well in any rich soil.
REPRODUCTION	Flowers in high, branched stalks, white, appearing in spring, ⅛ inch or more across, very numerous. Fruits frequently do not form and apparently do not produce seeds that will germinate; short and oblong. Reproduction commonest by root division, a divided root quickly developing independent plants under favorable conditions.	*C. marilandica* has bright yellow flowers that open widely from June through September in loose clusters at bases of leaves near end of stems. Five almost equal widespread petals. Fruit slender, flat, slightly curved pod to 5 inches long with segments about as long as broad; hairy, at first. Root perennial.	Flowers white, 1 or 2, in obscure head and practically without stalks to main stem. Calyx hairy. Fruit a pod, to 6 inches long, slender, curved, with beak 1 or 2 inches long, and many seeds. Unlike related alfalfa pods, it is straight, and unlike related sweet clover pods, it is beaked. Seeds number about 16. Blooms June.	Flowers purplish tinged, blue or white; corolla about ¾ inch long, with an interior hairy ring; arranged in whorls about stem; bloom during summer months; somewhat bell-shaped, with thin but conspicuous calyx surrounding corolla base. Some varieties have leaves that may be yellow, red or white. Fruits 4-parted.
CULTURE	Roots are usually dug in fall, washed, scraped or grated and sold either as a fresh product or mixed with vinegar. The pleasing taste is due to the glucoside, sinigrin, which breaks down in water and is similar to mustard oil in many respects. The fresh root is far more powerful than the dried or preserved.	Leaves gathered for their medicinal value when plant is in bloom. Medicinal properties extracted either by water or by alcohol. By many, it is believed to be as valuable for medicinal purposes as are the foreign species, and it can be raised locally much more cheaply.	Requires potash and phosphoric acid for seed production; nitrogen, for forage; deep plowing, thorough harrowing. Sow broadcast, 10 to 20 pounds per acre; drill, 7 to 10 pounds, 18 inches apart. Thin, at 2 to 3 inches. Clean culture to maturity yields forage in 4 to 5 months, 950 pounds per acre. Seeds flavor stock foods.	No acid treatment necessary to germinate seeds. Set plants 18 to 24 inches apart. Collect leaves at maximum growth. Dry leaves protected from sun or rain and stir to prevent mold. Volatile oil contains pinene, cineol and salviol, all having warm, bitter, sharp taste used in flavoring "flat" foods. Fragrant gum and resin also produced.
ECONOMIC IMPORTANCE	Horseradish has long been used as a condiment in the treatment, with or without reason, of dyspepsia, rheumatism, scurvy and hoarseness. A teaspoonful of the root to a cup of boiling water is the usual dosage, one or two cups a day being considered sufficient and these being taken at intervals, a mouthful at a time.	The medicine serves as a cathartic. A teaspoonful of the dried leaves steeped in a cup of boiling water for a half hour is a standard dose if one-half cup is drunk before retiring or a mouthful taken 3 times a day. Indian and Tinnevelly senna yield official drug.	More than 310,000 pounds of fenugreek were imported into the United States in 1935. Seeds, human food; Egypt, with flour in bread; Greece, boiled or raw, with honey; India, with condiments in curry; Orient, to fatten women. Seeds not used as internal medicine but may incite thirst and force fattening.	Oil obtained by distilling leaves in water or extracted with alcohol. Used as stimulant or tonic, particularly in infusion. A teaspoonful of leaves to a cup of boiling water, which is later cooled and taken a large mouthful at a time to a total of one or two cupfuls a day as standard dosage. Not officially recognized as a drug.

SPEARMINT *Mentha spicata*	PEPPERMINT *Mentha piperita*	MOCK PENNYROYAL *Hedeoma pulegioides*	CARAWAY *Carum carya*	FENNEL *Foeniculum vulgare*
Height, to 2 feet. Stems arising from underground stems, erect, nearly smooth, square, leafy throughout, with ascending branches. Leaves without petioles, or with very short ones, under 2½ inches long normally, with saw-tooth margins, opposite, conspicuously ribbed, more or less uniform green but somewhat lighter beneath. Roots develop freely from the buried stems.	Height, to 3 feet. Stems erect, ascending, square, branched, smooth. Leaves on petioles, to 3 inches long, smooth, or slightly fuzzy on the veins beneath, spotted with little oil globules, rather dark green, opposite. Roots fibrous or springing from stems that may have become buried in the ground.	Height, to 1 foot. Stems branching near the ground many times and curving upward to form a loose, flattened, open sphere, slender, square, tough. Leaves fine, under 1 inch long, opposite, oblong, on short petioles. Roots fibrous, much branched, with a central, fine taproot.	Height, to 3 feet. Stems slender, erect, smooth, furrowed, hollow. Leaves compounded like the parts of a feather into many narrow segments; twice or thrice compounded, smooth, light green. Roots thick, spindle-shaped, deeply penetrating, or tuberous, and rather tough.	Height, to 5 feet. Erect, much branched, more or less downy. Leaves 3 to 4 times compounded, in a feather arrangement, with the ultimate segments very narrow and thread-like and with the bases of the long petioles clasping the stems and broad. The whole plant rather aromatic when crushed.
Native of Europe and Asia but naturalized widely in North America. Particularly common in wet places about old gardens in the eastern United States and to some extent in the middle West, where it is cultivated. Known in literature since Biblical times. In Matthew 23:23, we read of the Pharisees giving tithes in mint.	Native of Europe but widely naturalized in America, where it grows in relatively thick stands in water-soaked or well-watered ground. It has been cultivated as a crop in America for more than 100 years. A related Japanese peppermint, *Mentha arvensis* var. *piperascens* is extensively cultivated in Japan and the United States as a source of menthol.	Native of America and closely related to true pennyroyal, *Mentha pulegium*, of Europe. The American species is found from Nova Scotia to North Dakota and southward, growing best on dry, shady hillsides and generally in rather poor soil, either in woods or in open, but particularly in limestone territory.	Native of Old World but well naturalized in many parts of America, and not uncommon as a weed in waste places. Probably named from Caria, a place in Asia Minor. Long cultivated in Europe, even by early European lake dwellers. Probably will be a reasonable market for caraway seed in America from our gardens for long time.	Native of southern Europe but established rather widely but not abundantly in America. Most common as an escape in the Maryland-Virginia region, but grown in gardens almost anywhere. Commercial fennel comes, for most part, from Germany, but there is no reason why this must continue to be so. It is grown by the Chinese, Hindus, Egyptians and Romans.
Flowers in whorls, on slender spikes with the central spike being longer than the lateral ones, the central being up to 4 inches long. Flower clusters narrower and more pointed than in peppermint. Flowering time, July and August. Corolla pale blue, to purple, but not conspicuous except as a mass.	Flowers in thick spikes, to 3 inches long. Corolla purple or rarely white, smooth, mint-like. Calyx tubular, five-toothed, resin-dotted. Flowers appear from July through September but are not conspicuous. Of the group of spikes, the central one is often shorter than the outer ones.	Flowers small, light blue, in clusters forming whorls with bases of leaves. Corolla mint-like, with upper lip notched, and whole thing scarcely extending outside rather large calyx. Corolla about ⅕ inch long or less. Fruit in 4 parts. Annual plant, regionally abundant, but rarely forming a pure stand. Flowers from June to October.	Flowers small, white, rarely pink; appear in May and June, in compound clusters, which are themselves compounded from a common point (compound umbels). Fruits, when ripe, about ⅛ inch long, brown, with alternating light and dark brown ridges and grooves, and with two parts more or less loosely connected. When cut across, fruits show 1 or 2 oil tubes to each groove.	Flowers yellow, in large open clusters, groups springing from a common point (umbels) with around 20 in a cluster, appear during summer months. Fruits slender, oblong, smooth, round in cross section, flattened from back, and with prominent ribs down back, with single oil tubes showing between ribs in cross section.
Flavor of spearmint is much milder than that of peppermint and fresh leaves are therefore much more popular in soups, salads, and beverages. Mint juleps get their name in part from the spearmint in them. Leaves and stems are used fresh or may be dried and added during the cooking process. The flavor in gum is known widely.	Peppermint oil is extracted from leaves and tops, being cut by mowing machines when in flower. Dried and then hauled to distillery. New York was first American state to cultivate peppermint, but it is now led by Michigan, Indiana and Pacific Northwest. Around 400,000 pounds of oil are produced annually in United States.	Oil similar, but not quite so strong as that of true pennyroyal. Highly pleasing to many people and so strong that plant may be detected by scent at some distance. Scent is believed to be obnoxious to fleas and to mosquitoes. The oil, which has a place in commerce, is extracted from the leaves and tops.	Fruits yield a volatile oil, about 5% of which is used in making commercial tincture of cardamom. Fruits find great commercial outlet as flavoring for breads, cakes, and as added flavor for candies. Plant easy to cultivate and is raised much like its relative, carrots. Biennial. Known as Kümmel in Europe.	Cultivation is simple and like that of carrots. Name refers to hay-like odor. Medicinal property is volatile oil to be found principally in nearly ripened fruit, where it constitutes about 2 to 6 percent of material. All parts of plant may be used. Fruits common in flavors for candy, perfume, soap, medicine and liquor. Leafstalks used as vegetable.
Active principle is volatile oil which, in addition to being aromatic, has ability to reduce gas in stomach. Used in water or as a distilled spirit as are anise and peppermint. To milder degree, has same general effects as do they. Applied externally, oil may cause a flush which is harmless but to some may be attractive. Official drug plant.	Peppermint oil has a refreshing odor and a cooling effect. It is used to flavor candy, soap, perfume, gin, and in external and internal medicines. Menthol, a derivative, is used much in treatment of colds, stomach troubles, rheumatism, neuralgia, toothache and other troubles. Peppermint oil is sometimes used to detect leaks. Official drug.	Oil of pennyroyal from native species is used not only to drive away insects but also to flavor soaps and some perfumes, and in salves to serve as a counter-irritant. It also finds a use in internal medicine, in which case it tends to stimulate the flow of liquids, and, among other things, causes increase of perspiration. Not official drug.	As a medicinal agent, relieves gas in stomach; also serves as stimulant, as a flavor for perfumery and liquors, and is a common home medicine that may be used safely without expert advice in treatment of mild cases of colic. Usual dose, a teaspoonful of fruits cut small to a cup of boiling water; a cupful being drunk slowly in a day.	Oil from fruits is used chiefly to settle intestinal disturbances, such as gas in stomach; is extracted most commonly by steeping them in boiling water. Is believed that there will be a considerable commercial demand for plant and its culture is recommended by some resource commissions.

COMMON NAME SCIENTIFIC NAME	CORIANDER *Coriandrum sativum*	ANISE *Pimpinella anisum*	JIMSON WEED *Datura stramonium*	CASCARA *Rhamnus purshiana*
GENERAL DESCRIPTION	Height, to 3 feet. Erect, slender, branching, smooth, strong-smelling. Leaves compounded into three parts, or with parts arranged like those on a feather; the upper divided into fine slender parts. Two species both considered annual by some authorities but also considered as perennial by others.	Height, to 2 feet. Erect, branched, smooth stem. Leaves three times compounded, the basal with long petioles, or simple, with coarse teeth, and with lobes broad and coarsely toothed. Upper leaves have finer parts. Root spindle-shaped and woody, with finer branching roots from the main one.	Height, to 5 feet. Bushy, smooth, fetid, stout-stemmed, yellowish green. Leaves large, coarse, smooth, coarsely veined, arising from the forks in the stem and with irregular bases. Roots large, coarse, whitish, breaking into many branching fibers but rather deeply penetrating.	Small tree, to 60 feet high with trunk, to 20 inches in diameter. Bark close, mottled, usually under ¼ inch thick, dark or light brown, often tinged with red and broken on the surface into small, thin scales. Winter buds naked, hoary, fuzzy. Leaves almost entire, 1½ to 2 inches wide, with broad prominent midrib and branching veins.
RANGE	Native of the Mediterranean region, but most extensively grown in Morocco, India and Europe and might well be grown in America more commonly. It has been long mentioned in Egyptian, Hebrew, Sanskrit and Roman literature, these references going back to the Middle Ages. The name is an old Latin one connected with the Greek for bug.	Native of Egypt; now cultivated in Asia Minor, India and South America, escaped from cultivation in warmer Europe and America over wide areas. Most commercial seed came from Italy or from Italian stock. Genus refers to compound nature of leaves. Mentioned in earliest literature of Greeks, Hebrews and Romans. According to Matthew 23:23, Pharisees gave tithes in anise.	Native probably of Asia, but naturalized early in America even at time of first settlement of Jamestown, from which the name arises. Early settlers ate fruits and had startling hallucinations. Now found all over world with varying abundance. Known as drug-producer since 37 A.D. Favors rich soil in waste places. Cultivated in the United States and Europe.	Native of Northwest, ranging from southern British Columbia, northern Washington, Puget Sound region, Idaho and Montana to central California and southern slope of Grand Canyon in Arizona. Western North America has a monopoly on drug. Early Mexican and Spanish priests in California learned of its medicinal use from Indians. Lewis and Clark found it in 1805.
REPRODUCTION	Flowers small, white or pinkish in compound clusters whose stems spring from a common point (umbels). Outer flowers of the clusters have enlarged ray-like petals. Flower in July. The fruits are globular, yellow-brown, and, when fresh, have an unpleasant odor that is replaced by a fragrant odor when the fruits are dried.	Flowers small, yellowish white, in large loose clusters with a common base (umbels) the clusters being large and loose. Fruit not bristly or scaly and about ⅛ inch long, gray-brown and slightly downy. Oil from the fruit fragrant and stimulating to the taste, being somewhat sweetish. Flowers appear in late summer and autumn.	Flowers large, funnels, to 4 inches across, with a light green calyx and a white corolla, which has 5 coarse teeth along border. Flowering time, July through September. Fruit a large capsule most commonly rather sparingly covered with coarse spines but sometimes without these; breaks into 4 valves to free numerous, black, kidney-shaped seeds.	Flowers relatively inconspicuous, hung on slender stems often from leaf axils. Corolla minute, of 5 petals. Fruit like small, black cherries, to ⅓ inch through, with thin, juicy flesh and 2 or 3 nutlets each about ⅓ inch long, flattened on inner face and with thin, gray shell. Inner surface of thin seed-coat, bright orange.
CULTURE	Dried fruits yield volatile oil, coriandrol, ½ to 1 percent. Fruits, used extensively for flavoring sweet dishes particularly in India and Europe. Essence of fruits is considered better than fruits themselves for flavoring purposes.	The fruits provide the medicinal element, which is used more for flavoring bread and "licorice" candy and to make other foods and even medicines palatable. Between 1 and 3½ percent of the fruit is made of the volatile oil. It can be extracted partially by water and almost wholly with alcohol.	Almost all parts of the plant are poisonous, but appearance of fruits has led many an unfortunate person to try them for food with disastrous results. Seeds and leaves are most dangerous. Leaves, gathered when plant is blooming and dried in shade; oil extracted by water or alcohol. Seeds crushed when unripe for daturine.	Since 1877, cascara has had official listing as helpful drug. Bark, peeled from woody parts down to 2 inches in diameter, dried slowly and sold. Bark of older trees is superior; that cured for 2 years, best. Trees peeled should be left with live bark near base; should be cut to encourage new shoots; if under 5 inches through should be left.
ECONOMIC IMPORTANCE	Oil used as medicine acts primarily in reducing gas in intestinal tract. Candied fruits imbedded in sugar make a pleasing confection known as sugar plums. Commonest use of the oil is probably as a flavoring for whiskey, gin and other liquors although, as suggested above, the only service rendered here need not be that of adding flavor and fragrance.	Anise oil is used to prevent nausea, in the treatment of colic in children and as suggested above. Culture is simple and much like that of closely-related carrot. Distilled oil used to flavor medicine, perfumery, sprays and beverages. The liquor, anisette, gets its flavor from anise. Was used as a potherb in England about 1542 and as such was heavily taxed.	Daturine is a mixture of atropine and hyoscyamine which, in many respects, is similar to belladonna. Contact with leaves may produce a severe dermatitis. Drug causes headache, vertigo, great thirst, nausea, lack of coordination, hallucination, dilated pupils, loss of sight, convulsions, mania, death. Used as a narcotic, in treatment of asthma. Official drug.	Drug, cascara sagrada, produces the principal constituent frangulin, a mixture of frangulic acid and emodin and a bitter resin, the latter being modified in some fluid extracts by magnesium oxide. The drug is a standard cathartic and a tonic. It is used widely in the military forces. An official drug plant. A 3-inch tree may yield only 5 pounds of bark.

HOREHOUND *Marrubium vulgare*	BELLADONNA *Atropa belladonna*	DIGITALIS. FOXGLOVE *Digitalis purpurea*	HENBANE *Hyoscyamus niger*	WILD CHAMOMILE *Matricaria chamomilla*
Height, to 3 feet. Stems branched, ascending, white hoary, aromatic, square. Leaves opposite, rough, conspicuously veined above, woolly beneath, roundish-oval, with a narrowed petiole, ½ to 2 inches long, bitter juiced. Roots perennial, fibrous. Tops are annual.	Height, to 6 feet. Erect, well branched in upper parts. Somewhat hairy. Leaves entire, on short petioles, oval, alternate below, often opposite above, to 6 inches long, dull green, somewhat pointed at tip. Root thick, fleshy, creeping horizontally, perennial, although the stem above ground dies back each year. Plant has a vigorous appearance in general. Sap red.	Height, to 6 feet. Erect, stout, unbranched, downy, rather succulent. Leaves alternate, the lower with, and upper without, petioles, entire, or coarsely-toothed on margins, rough to downy, the upper much smaller than the lower, 4 to 12 inches long, 2 to 6 inches wide, dull green, grayish beneath, wrinkled, densely hairy beneath and sparingly so above.	Height, to 2½ feet but commonly little over 6 inches. Leaves large, to 8 inches long, oblong, commonly crowded, the lower with petioles and the upper without, their petioles or bases clasping the stem, dull pale green, with long hairs on the midrib. Root long, thick, spindle-shaped, corrugated, brown on the outside, white inside, reasonably tough. Odor fetid; smells like tobacco.	Height, to 2 feet. Erect, smooth, much branched, annual. Leaves 2 to 3 times cut like the parts of a feather with short, narrow segments and the flowering heads nearly an inch across. Leaves light or dark green, and generally appear like a fragile loose lace, which gives the plant a highly ornamental appearance.
Native of Europe, but well naturalized in America, where it has long been established as a weed from Maine to Ontario and westward to Texas, California and Oregon. Best in dry, sandy fields, wastelands and roadsides. Cultivation is simple on such grounds. Name refers to bitter taste. Cultivated extensively in Europe and Asia.	Native of Europe and Asia, where it grows in waste places and among ruins. In some places in the eastern United States, it has become naturalized in waste places. It gets its name "Belladonna" from the Italian for beautiful woman since its red sap was used for a cosmetic in Italy. Widely cultivated in United States, Europe and India.	Introduced from Europe and widely cultivated as a garden ornamental throughout the United States. Native of western Europe. Has become a weed, particularly in burned-over lands on the West Coast of America from British Columbia to California, being particularly common in rich lowland pastures.	A weed in dry wastelands, particularly in sandy areas. Introduced from Europe and established in northern states and Canada, more particularly in Northwest. Sometimes cultivated for its medicinal properties; seems to be plant of old settlements, graveyards and about foundations of ruined houses. Common names, Hog's Bean, Devil's Eye and Jupiter's Bean.	Native of Europe and northern Asia; cultivated and sometimes escaped in North America. Most commercial chamomile has been imported from Germany and Hungary, although there is little reason why this should be necessary. The name is from Greek, meaning earth apple, and refers to apple-like smell of the heads.
Flowers appear June to September, in dense clusters crowded at bases of leaves, relatively small, white, with a calyx bearing 10 teeth, alternating large and small, and each ending in a hooked spine; stamens four. Corolla 2-lipped, the upper being erect and commonly notched. Fruit deeply 4-lobed and produces hard nutlets.	Flowers appear from May to August, solitary or in pairs, nodding or erect, from axils of leaves. Corolla dark purple, or dull red, and about 1 inch long. Fruit, mature in September, about ½ inch across, crowded with seeds, shining black, nearly globular, but with a suggestion of being 2-lobed; purple-violet juiced.	Flowers tubular, inflated, drooping, white or purple, commonly spotted, about 2 inches long, with 4 stamens, arranged in rather heavy, compact spike-like clusters but each flower on a little stalk of its own. Fruit; a 2-celled, many seeded capsule. (400,000 seeds per ounce.) Leaves have bitter odor and taste.	Flowers funnel-shaped, almost or wholly without stems, in one-sided, terminal clusters, yellow, with purple veins, and purple throat or greenish yellow, 5-lobed. The fruits are enclosed in the calyx and are 2-celled, many-seeded capsules that open by a transverse lid. About 55,000 small, egg-shaped, brown seeds per ounce. Biennial or annual.	Flowers in daisy-like heads, with yellow disc flowers in center, and rather slender, white, ray flowers around edge, these latter numbering 10 to 20. When flowers are broken from receptacle, they leave no remaining scales. Fruits have no downy parachutes, and are faintly 3- to 5-ribbed. Bloom from May to August. America imported 139,440 pounds in 1935.
Dried leaves and flower-tops are chief parts used in medicine. Principle is a volatile oil, a substance called marrubin and a resin, which are extracted in water or in alcohol. In 1935, the United States imported 92,000 pounds of drugs from horehound in spite of the fact that the plant can be grown here easily, and has a ready market.	Seeds treated 45 seconds with concentrated sulphuric acid and then washed before planting in shallow flats. Transplanted to rows 3 feet apart or 4000 per acre (20,000 seeds per ounce). Requires frequent cultivation and sprays to keep down cutworms, preferably pyrethrum or arsenate sprays. Yields hyoscyamine and hyoscine.	Leaves collected from two-year-old plants at commencement of flowering, are used medicinally and yield digitalin, digitoxin and digitonin, all glucosides. Dry at temperature below 140° F. Because of bad taste, cattle and horses normally will not eat it. If they do, they may be seriously poisoned.	Treat seeds 15 seconds with concentrated sulphuric acid, then wash quickly in water to assist in germination. Leaves, fruits and stems up to 7 mm. diameter are harvested. Leaf-drugs are collected from second-year biennial plants. Plant yields hyoscyamine, hyoscine and atropine. Name refers to supposed use as swine poison.	Drug is a volatile oil, which is extracted from the flowering heads that have a strong, unique, aromatic odor and a bitter taste. The extracted oil is rather thick, deep blue at first and later brown, known in commerce as matricaria or as anthemic acid. It is often extracted simply by boiling the heads in water.
Medicine used in hot water infusions or in lozenges for treatment of colds, rheumatism, dyspepsia and other troubles. Common, old-fashioned home remedy that is probably harmless. In large doses, it acts as a purgative; is used this way in treatment for worms. Not recognized as official drug.	Known for centuries as a poison; and the ability of the drug, hyoscyamine, to dilate the pupils of the eyes, as a heart stimulant, and its use externally to allay pain have long been known. Used in treating whooping cough, rheumatism, neuralgia, scarlet fever and in convulsive diseases, but is too dangerous to be used except by experienced physicians.	Useful in treatment of rapid and feeble pulse, poor circulation and many other diseases. Aids circulation and consequently nutrition and waste disposal. Used externally in treatment of dropsy and enlarged glands. Drug too potent to be used except on advice of physician. Level teaspoonful of dried leaves in pint of boiling water is a strong dose.	Any part of plant may be poisonous to eat. Drugs from it are used like belladonna as a sedative, in treatment of convulsive diseases, in treatment of pain, to correct nervous sleep and for a great variety of other purposes. Too potent to be used except on advice of a regular physician. Poisonous to poultry but not to swine.	Matricaria or wild chamomile as a drug serves to reduce gas in digestive tract, as a sedative or sometimes stimulant or tonic. Commonly used to soothe children who are disturbed by teething, for earaches, intestinal and other localized pains. Relatively harmless, so may be used as home remedy. Also used as a hair rinse to add a luster to hair.

(Continued from page 83) fennel, fenugreek, henbane, peppermint, pennyroyal, sage and spearmint. We are already raising some of these in considerable quantities, but not to such an extent that we can consider ourselves independent of other parts of the world. None of us want to revert wholly to a state of isolationism, but there is a difference between isolation and independence. The famous freedoms call for freedom from fear and want, which freedoms would be well established if we were not dependent on others for important things that we can ourselves produce.

The production of many of the things that herb gardens yield calls for intensive cultivation of small areas of land. The preliminary processing of some of these materials may be done satisfactorily, although not necessarily with complete efficiency, in small home plants in the barn or over the garage. This calls for the kind of side-line hobby that so many Americans like to take up, and ranks well by any standard with the general run of hobbies.

The author of one of the most-used standardized school tests once told me that his test must be good, since it sold so well. Nevertheless, it was necessary to call to his attention the fact that nearly ten percent of the units were factually inaccurate. I did not agree with the test author's philosophy in regard to tests, and probably should not adopt that philosophy in selecting species for consideration in an article on herb gardens. Sale value of garden products is a factor, however, and if the product does no harm it probably might as well be raised as not. An invalid educational test that advances or retards a student is, to my mind, much more harmful socially than the use of horehound candy when horehound does not happen to be listed as "official" by the pharmacists. Besides, herb gardens are not limited in their production to things bearing the approval of the medical profession. If horehound candy tastes good, we will continue to raise horehound for the pleasure it gives and that is as far as this article is concerned.

A few of the old stand-by medicinals that have lost standing with the medical profession—although they may still have some standing with the quacks or with the common folk—might be listed. In this list would be marsh mallow, pipsissewa, conium (Socrates' hemlock), lady slipper, wahoo, thoroughwort, geranium, cotton bark, witch hazel, pennyroyal, burdock, culver's root, horehound, poke, white oak bark, smooth sumac, blackberry, sage, skullcap, snowball, chamomile and calendula. Others that may be grown here, and that are not mentioned in the chart section of this insert, are black cohosh, ergot, lily of the valley, eucalyptus, wintergreen, gentian, grindelia, hop, goldenseal, lobelia, lycopodium, mezereum, opium, mandrake, rhubarb, bloodroot, sassafras, scilla, white mustard, black mustard, slippery elm, American hellebore and prickly ash. Among those that yield drugs with officially recognized value are henbane, matricary, peppermint, spearmint, pumpkin, cascara sagrada, senna, Jimson weed, dandelion, anise, flax, Indian hemp, calamus, hemp, belladonna, digitalis, caraway, coriander, and others.

The uses of drugs yielded by plants rival the motives behind the most lurid plots of the movies or of the pulp magazines. Murder, robbery, incest, white slavery, debauchery, drunkenness, forgetfulness, unwarranted elation, sleepiness, wakefulness, relief from pain, titillation, loss of strength and overstimulation of strength, these are only a few of the many abnormal conditions commonly induced in men and women by the use of plant drugs.

The common hemp, considered in the insert dealing with fiber, has a host of uses in the drug field. Marijuana and bhang are derived from the twigs and leaves. Combined with opium, one drachm is reputed to have enough strength to "overthrow an elephant". Smoked in cigarets, it stimulates persons who do not need stimulation, and, among many other results, puts a dangerous courage in irresponsible gangsters and gun-molls. If the leaves are eaten under certain circumstances, they are known as hashish, and a hashisher, when spoken of in a more rational sounding way, gives the word "assassin". One ancient commentary on hashish says of the leaves that when they are "swallowed by man they garreth (maketh) him prattle of whatso he pleaseth and chooseth making him now a Sultan then a Wazir and then a merchant, the while it seemeth to him the world is in the hollow of his hand."

Drugs from plants enter prominently into international affairs. They are smuggled rather extensively from one part of the world to another. The British would find it difficult to justify their part in the opium trade in China, and we to reconcile the fact that we condoned this and other abuses to which the Chinese have been forced to submit. We rise up and cheer Madame Chiang Kai-shek, and forget that for years we, without evident shame, shipped vital supplies to the avowed enemy of her country, and refused to offer effective protest when her countrymen were despoiled by opium.

One should not get the idea from this article that one can go out in the front yard and dig up the dandelions and sell them for enough to pay the current income tax. Careful work and intelligent management are necessary if herb-raising may be profitable. A couple of generations ago ginseng gardens were to be found in many backyards. The fact that they are not still there indicates that the raising of "shang" or "seng" is a precarious commercial venture. Perhaps this is just as well.

Various states have taken up the growing of medicinal herbs rather seriously. Minnesota and Iowa are among those that might be mentioned in this connection, since they are studying how that part of our country may be made to yield plant drugs for the production of which we had come to look solely to other parts of the world.

A number of reliable seed stores have seed stock and directions for growing the plants that may be had by interested parties. It is generally best to seek stock and suggestions from sources near at hand, and particularly to use stock able to thrive in the area where you live. Reputable seed houses include the following:

New York—Peter Henderson and Company, 35 Cortlandt St., New York City; Vaughn's Seeds Store, 43 Barclay St., New York City. *Vermont*—Frederick H. Horsford, Charlotte, Vermont. *Pennsylvania*—Henry A. Dreer, 714 Chestnut St., Philadelphia; W. Atlee Burpee, Philadelphia. *Georgia*—International Seed Service, Atlanta. *Illinois*—Hopedale Nurseries, Hopedale. *Michigan*—Burgess Seed Company, Galesburg; D. M. Ferry and Company, Detroit. *Minnesota*—Bofferding Seed Company, 652 2nd Ave., North Minneapolis; Danish Seed Company, 14 Glenwood Ave., Minneapolis. *California*—Carl Purdy, Ukiah.

As We See It

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Man and Nature

A Guest Editorial by WALTER P. TAYLOR

CLOSE scrutiny indicates the intimacy of the interrelationships of plants, animals, and environment. In some manner man, along with other organisms, is adrift in the ether, going he knows not where. Each animal and plant, each inorganic element and compound, is a part of a great functioning whole. When one element or compound or organism is affected, all the others are bound to be influenced, for better or for worse. Man belongs to this great system of matter and energy, of the inner workings of which he has obtained tantalizing and intriguing glimpses. Great is man's responsibility so to exert his relatively great powers that the system will not be too much disarranged! Man's interest is so inevitably and completely bound up with the soil and its products, the plants and the animals, that any injury he does to these things, any exploitation, is almost immediately reflected back, to his own injury.

Conservation should be the foundation of ethics, far more important than any other phase thereof. The most serious and deadly sin man can commit is the waste or maladministration of the great natural resources with which the earth is endowed. Such exploitation partakes of the nature of self-mutilation.

On the other hand, the greatest service that man can perform for himself or his fellows is constructive conservation. All the potential developments of science, art, religion, indeed, civilization itself, depend on a proper supply of basic natural resources—the wealth of the land.

A former diplomatist and scientist (Marsh), writing during the latter part of the nineteenth century, said ". . . we are, even now, breaking up the floor and wainscoting and doors and window frames of our dwelling, for fuel to warm our bodies and to seethe our pottage [he might have added: and to fight our wars], and the world cannot afford to wait till the slow and sure progress of exact science has taught it a better economy."

These words of wisdom deserve emphasis as we carry forward a worldwide conflict, and as we look toward a stable peace and an advancing civilization.

Dictators may come and dictators may go; but if the soil is depleted, the waters polluted, the grass destroyed, the forests cut, the birds and mammals destroyed, then mankind goes! Neither dictatorship nor democracy can survive in a used-up world.

Certainly we have only to look to history for the proof of this. And the world conflict now raging brings into sharp focus the vital importance of natural resources. It is these, indeed, that will decide the issue, and the nations that use them most wisely will be the stronger at the end of the struggle.

Our most important immediate job is to beat the Axis; but we must never give over the fight against those selfish exploitative tendencies in ourselves and others which, uncurbed, will make man's survival impossible on this earth.

Moratorium

By HOWARD HAYNES, U.S.M.C.R.

The wild goose led his sunset V
across the hidden hunter's line of sight;
The death charge roared. The broken bird
plunged lifeless down to the tidal flats.
The pilot hurled his bomber like a lance,
crusading for ideals he cherished;
The ack-ack fire reached up its searing fingers
to pull him into the cold North Sea.

The bleeding bear exploded from the oak-scrub,
his brown body a dynamo of fury;
The high-powered rifle drove leaden slugs
spanging into his stubborn skull.
The big Marine had starred on football fields
where courage spurns the quitter's code;
Unflinchingly he took the stabbing steel
that stopped him on Tarawa's coral sand.

For meat we stalk wild game in fields and forests;
we seek the lure of dim, rough trails;
The hunter's moon whips up a surge of spirit;
our hearts pound to thrills of the chase.
War's hell . . freedom chained . . . ideas that bewilder . . .
"Thou shalt not kill." . . . "Peace on earth." . . .
How can I hunt again? I'll put away my guns!
There's been such suffering—so much of killing.

The Motmot

By KARL PLATH

A Brazilian motmot at the Chicago Zoological Park in Brookfield, Illinois. This bird's bill was deformed in such a way that it would have been impossible for it to cut out the barbs of its tail feathers. Yet it acquired the racquet tail. Photograph by Ben Hallberg.

MANY years ago, when old natural histories provided me with my first glimpses of exotic bird life, I was particularly fascinated by the motmot. It takes its place in the company of strange birds because of its pair of long tail feathers, the shafts of which it is reputed to trim save for little racquet-shaped bits of feather it leaves on the tips. Study and personal association with a motmot in captivity raise some questions about this practice.

Motmots are birds of tropical American forests, allied to our kingfishers. Their popular and scientific name comes from the French—*mot mot*—which is pronounced *mo-mo* and describes the somewhat melancholy croak or hoot of the bird. They are solitary birds during the day, but in the early morning and at dusk are active in pursuit of insects. They also eat fruit, small snakes and lizards, and the eggs of other birds. Their plumage is brilliant, varying with the twenty-odd species, and including greens, blues, violet and pinkish brown.

Best known of this family is the Brazilian motmot, and it was one of these that came under my care at the Brookfield Zoo. When this guest arrived it had its full-length tail feathers. One of these showed evidence of mutilation; the other was untouched, although the part where the shaft was later to become bare showed a decided narrowing before it expanded to its normal width near the tip. Each fall the bird undergoes its moult and the perfect feathers grow out. In a few days a tiny gap appeared on one side of one of the long feathers, and the shaft was denuded before the other tail feather adornment became completed.

Our bird has a malformation of the mandibles, which would make it impossible for it to grasp so delicate an object as the barb of a feather. Nor have we ever seen it preen its tail feathers. Yet two weeks after the completely feathered tail developed after moulting, the motmot had its racquet-shaped remnant of feathers nicely arranged. Dr. William Beebe reports that a captive motmot in his possession was seen to preen its tail feathers, completing the job in one week. Once the bird was seen to pick off a bit of broken sheath and with it several barbs. At a disadvantage, our bird must have worn away its barbs. Other reports sustain Dr. Beebe, and one states that young birds taken from the nest were observed to start denuding their tail feathers within a month after they were fully developed.

Other tropical birds with racquet-shaped feathers are racquet-tailed drongos and racquet-tailed parrots. With these birds this is apparently a natural phenomenon. It is amusing, perhaps, if not scientific, to wonder whether the motmot admires this sort of feather arrangement as giving it a certain individuality, and takes a practical way of achieving it. Also, it is not impossible that persistent following of this practice by the motmots might finally result in denudation becoming natural with them. Skins that I have examined show a degeneration in the strength of the barbs, and indicate that the feathers may leave the sheath partly denuded. So possibly this trend is now taking place.

As a pet the motmot is charming and shows evidence of intelligence. Ours is very tame and playful. It delights in bringing a morsel of food or piece of branch to the front of the cage but just beyond reach, then bowing its head and gurgling its indescribable hoot. Motmots affect a pose of semi-lethargy, and if one passes the cage and calls to our bird it suddenly comes to life, swishing its tail pendulum-like.

Fruit, hard-boiled egg and mockingbird food please the motmot. Small lizards and mice are appreciated treats. Once we witnessed an amusing tug of war with the motmot on one end of a garter snake, and a hunting crow on the other end. Both were victors.

A peppier pepper, a meatier squash, a headier lettuce and a substitute for spinach are among the—

V-Garden Stars for 1944

By ANDREW S. WING

THIS season's crop of garden starlets, although of war-time proportions, is not lacking in interest. If you want a sweeter sweet corn, a meatier squash, a headier lettuce or a peppier pepper, they are yours for the asking, plus a few cents for the seedsman's fee. There is even a new substitute for spinach. There are plenty of new and worthwhile things to try, and some revivals of old favorites that are better than many of the new varieties.

Of course, there's only one real way to make up a garden planting list, and that is to go catalog shopping. Do not take my say-so, or any other's, but write for two or three good seed catalogs—or borrow them—and browse at will. Then boil your list of taste-tempting vegetables down to the size of your garden's capacity, and order what appeals to you most, not forgetting that you cannot build a good garden of novelties alone. You have to have a few standbys to make the enterprise pan out. And a garden that does not give you "pay dirt" is just no good at all this year—or any other year, for that matter.

However, to give you something to start with, here are a few of the more promising novelties to consider when you make up your list.

Since the All-America Selections are the official choice of a committee of impartial experts, it is well to look at them first. First choice this year is the new lettuce, Great Lakes, an origination of the Michigan Experiment Station. This is an improvement on Iceberg, the common cabbage-head type of the markets, which is so hard to make behave in the ordinary home garden. Great Lakes is said to head up well, even in eastern gardens; nor does it bolt so fast and go to seed as the weather warms up. The quality and taste are reported to be excellent, and it seems to be a worthy new variety.

Since lettuce is one of the musts of every food garden, there are a few other varieties worth noting. Plant them in succession, a few weeks apart, a few yards at a time, for good salads throughout the summer. You will hear a lot in lettuce circles about Bibb lettuce. Just in case you do not know Bibb, it comes from Kentucky where it was named for a Colonel Bibb about a century ago. It has recently been rediscovered by the lettuce lovers, who proclaim it as being a small-heading variety with a flavor that is definitely distinct. Some gardeners, however, report a little difficulty in making Bibb head up. Nevertheless, it behaves beautifully indoors, as well as in Florida and certain other sections of the country, but may need further testing in the North.

Another home lettuce that is rated high by such lettuce fans as Fred Rockwell and David Platt of the Schling organization is Mignonette, another small-heading variety with an attractive brownish tinge to the outer leaves. And of course there is Oak Leaf, another old variety that is hitting the salad fanciers right where they are most sensitive. This, too, should be a must if you have the space to try several varieties of lettuce. If your conscience hurts you at ordering so much seed, share the seed, or, better still, the plants, with your neighbors.

Mason's Golden Midget is a new yellow corn for the smaller Victory Garden. It is early and grows on a short stalk, can be planted more closely and is said to be more flavorful.

In my own garden I always have several plantings of Cos or Romaine lettuce, and then, of course, there are the loose-leaf types such as Black-seeded Simpson or Grand Rapids, which are more tender and more flavorful than the cabbage-type heads of the market. Being green, they are richer in vitamins, too.

Speaking of vitamins, no doubt you have heard that the nutritionists rate the leaves of such crops as turnips and beets as being more

nutritious than the parts that grow in the ground. In short, grow these crops for their tops and use the roots as incidentals, instead of the older way of cooking the roots and throwing the tops away.

At the Boston Harvest Show last September everyone was talking about an exciting new squash named Butternut. Since Boston is the squash capital of the nation, it just has to be good to win approval up there. This new variety is a Turk's cap with a rather short thick neck, and since it is not nearly so large as the average Hubbard, I inquired why it had won such favor. It turns out that the distinctive feature of Butternut is the neck, which is solid meat with no seeds. The flavor is said to be very sweet, the flesh tender but with no suggestion of walnut, as the name might suggest. Several seed houses list this variety this year, and it looks good. Among the summer squashes, usually easier to grow than the winter sorts, I shall plant Straightneck this year, in addition to Zuccini bush, as it seems to be about the most prolific of all and of good shape and quality.

There are several new varieties of sweet corn that sound interesting. Mason's Golden Midget is being boosted for Victory Gardens because it is so compact and prolific. I have not seen this new variety but its introducer, usually reliable, swears that it will bear three to five ears to the stalk, each ear being three or four inches long. It can be planted close because of its earliness and short stalk, and the flavor is said to be all that can be expected of a yellow corn. It should be good, if only half as good as he claims.

Cream of Gold is another new yellow corn that is highly recommended by one of the oldest and most reliable of the seed firms in the East. This one has a good-sized ear of fine quality, and it is a bit earlier than the mid-season sorts, which is an advantage.

David Burpee inspects a clump of Tampala, a new green vegetable brought to this country by Burpee. It is described as a "pleasing change from all other greens." It has been enjoyed in China and India for centuries. Below, first prize picture in the National Victory Garden Institute photographic contest. Billy Hurst and Marcia Rudy inspect the products of the San Jose Home of Benevolence garden, which covered about five thousand square feet of ground.

For new gardeners who like corn and have not had much experience growing it, Golden Cross Bantam would be a good bet, as it is now standard almost everywhere. And if you want that real old-time flavor, you cannot go wrong with Golden Bantam, although some of the newer inbred hybrids excel it in size of ear, yield, and earliness. Naturally, if you only have a pocket-size backyard, better not try to grow corn at all but concentrate instead on the crops that will give you more for your time and space. If you *must* grow corn and potatoes, better locate a vacant lot somewhere, or join a community garden project where at least forty by fifty feet of good, sunny, well-drained soil will be available for your plantings.

There is a new pepper named Ozark, reputed to be sweeter or something, a new All-America pepper, a new green string bean, and quite a few odds and ends if you look through the catalogs. By and large, the seed trade seems to have adopted the

wise war-time policy of concentrating on fewer worthwhile things, with volume production, rather than scattering their shots on a lot of novelties of dubious value. In this connection, it is a pleasure to make a bow in the direction of the men who grow and distribute our garden seeds for the fine job they have done in supplying almost double the number of peace-time gardeners with enough good seed to grow the bumper crop we harvested last year, and the even bigger crop we plan to sow and harvest this year. Remember that many of our seeds, such as cauliflower, onions, beets, spinach and others, were imported from Europe before the war, and that that supply has had to be built up in this country. In addition, we have been sending seeds to Russia, England, North Africa, and even to distant outposts in the South Pacific.

While looking through the catalogs, do not forget to watch for the special strains that are disease resistant. This is important in such things as tomatoes and cabbage. In tomatoes, Rutgers and Marglobe are still outstanding in quality and disease-resistance, although some prefer Pritchard. A fine new

A typical back yard Victory Garden is tilled by Elmer Young of Eugene, Oregon. In a plot 60 by 60 feet he raised a wide variety of vegetables to which color was lent by borders of flowers. This is the National Victory Garden Institute's second prize photograph, third prize going to the picture below of Mary Wood cultivating the home garden at "Wainwood Farm" in the Cowanesque Valley near Knoxville, Pa.

orange-yellow tomato that came out in 1943 and is really superior in size, yield and quality, is Jubilee.

This is not new, but it is new to many people — a winter-keeper beet. It grows to prodigious size and will keep on growing until the ground starts to freeze. The tops are coarse but good to eat and half a beet makes a meal for our family. The flavor is good and the flesh is tender. It keeps better than the ordinary garden beets because of its large size, being less subject to drying and shrinking.

New to many gardeners, too, will be such things as salsify (oyster plant), parsnips, mustard, kale, Chinese cabbage and kohl rabi. Yes, and there are still thousands to whom eating broccoli or Brussels sprouts from their own garden would be not only a novelty but a great treat. Ever try okra? It is easy to grow, excellent in soups, and a few plants will give you all you want. The edible soys have been widely advertised, but new varieties are coming out all the time, and eventually one will appear that is early, prolific, and *easy* to shell. There is no doubt as to their flavor, and their nutritional value has been advertised from one end of the land to the other. Eggplants are not hard to grow and are excellent on the table if you know how to cook them. The Turks and Armenians do, but few Americans have ever tasted eggplant any way but fried. Any good cook book will tell you how to do them broiled with mutton, or in other interesting oriental styles.

In the way of absolutely new vegetables, there is only one that I know of and that is Tampala. This was tried out in many gardens last summer, including my own, and is now offered with appropriate fanfares by a well-known Philadelphia seed firm. Tampala is of the cockscomb family, (Continued on page 104)

Snow geese on the Sacramento National Wildlife Refuge in California take to the air. Photograph from the Fish and Wildlife Service.

Why Say, "Don't Be a Goose"?

By W. L. McATEE

NOTHING in my experience with geese has led me to suspect them of the stupidity implied by nursery rhymes and popular sayings. How that impression arose is a question, one answer to which is that it was inspired by the somewhat clumsy appearance and motions of the domestic goose. To balance one bit of folk lore against another, it may be recalled that we are admonished not to judge by appearances. Thus even "goosey, goosey, gander" should be given the benefit of any doubt.

Until recently, when I learned that the small cackling goose can be tolled to a hunter by the waving of his hat, all evidence coming to me was to the effect that wild geese are very prudent in keeping away from man. The sea brant, at home on the water, skirts promontories and peninsulas, keeping over a familiar element, and with few exceptions takes no short cuts that would bring them over the land and unknown dangers. On the other hand, the greater snow goose, a land bird, in its principal winter home in North Carolina, feeds in shallow marshes by night and spends the day on high sand dunes where it can not be approached unobserved. It has never been hunted with much success except by the use of dazzling lights at night—a method now happily outlawed. The large Canada goose, best known of all our native species, is a marvel of wariness and sagacity and would seldom be taken under conditions equally favorable to the hunter and the hunted. The proverbial expression, a wild goose chase, shows that many men have not found it easy to outwit a goose. Men are wont to regard as boobies and fools any creatures that are easily approached and killed, but even by that strange criterion, geese, as a rule, are no boobies.

This statement applies to the gray lag-goose, an Eurasian species from which the common domesticated strains have been derived. That these birds have not lost their wits in the process is indicated by their capacity for training. Tame geese are handled in flocks in many countries and taught to come to the gooseherd upon signal, as the sound of a rattle. An instance is recorded of a gray lag-goose and a dog forming an attachment so that they fed and slept together. When the dog was taken to the field for its special duties, the goose wandered apparently disconsolate and cried continually until its return. Pliny relates that a goose was a constant companion of the peripatetic philosopher Lacydes, and would never leave him, night or day. Geese are long-lived, constant to their mates, and fight against any odds in defense of their nests. A goose 80 years of age is stated to have remained on the nest to be killed by a sow, rather than expose her eggs to the marauder.

The attributes revealed by these anecdotes are not those of dunderheads or cowards. In fact it is difficult to understand how a tradition of goose stupidity and ineptness arose in northern Europe. The Mediterranean people did not share it and they had a good foundation for their different estimate of geese. All of the early writers on Roman history describe an incident greatly to the credit of geese. Livy records that when the Gauls had overrun Italy, except the Capitoline hill in Rome, they had climbed the steep cliff on which the citadel was situated so noise-

lessly as to escape the notice not only of the sentinels but even of the dogs. Their presence, however, was detected by some geese, which, being sacred to Juno, had been spared despite extreme scarcity of food, and their trumpetings aroused the garrison in the nick of time. The invaders were driven away and, this battle proving to be the turning point in the war, were eventually expelled from the country.

Other writers embroider this tale, Aelian saying that the Gauls threw food to the dogs, which ate it in silence. The geese thus proved to be more effective guardians than the dogs. Pliny adds that the anniversary of the preservation of the Capitol was celebrated by sacrificing dogs and exhibiting a golden image of a goose, which was carried through the streets in a richly ornamented litter.

Ovid tells of geese being kept instead of house dogs, and credits them with being wiser than man's canine companion. Columella wrote also that they are favorites with farmers, requiring little care and being better than dogs as guardians. To me it is not a little significant that the opinion of this first-century Roman historian was the same as that of a farmer in Fairfax County, Virginia, who told me not long ago that his old gander was better than a watch dog. Indeed, I still wonder why people say "Don't be a goose."

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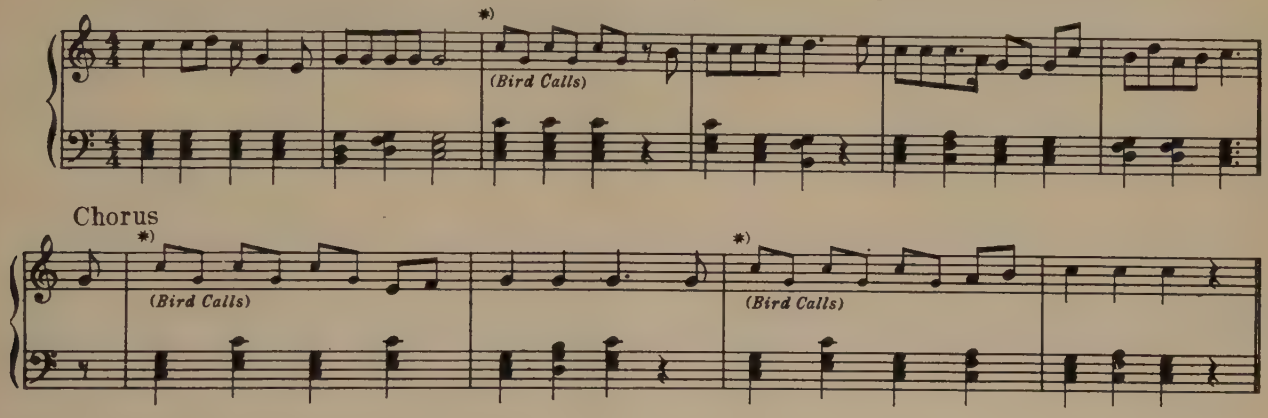
Bird Calls

Words and music by GRACE KEIR

Reproduced from "Songs of the Open" by special arrangement with the publishers, Carl Fischer, Inc.



N.B.*) The small notes supply approximate rhythm, the bird calls need not be sung or whistled on pitch.

High 'bove the valley
I heard a sweet voice say,
"Teacher! Teacher! Teacher!" *(Whistled)*
In such a high shrill way,
I answered back. He followed me,
He was so very gay.

Chorus:
So "Teacher! Teacher! Teacher!"
Whistled I, quite high,
And "Teacher! Teacher! Teacher!"
In the trees near by.

Down in the orchard
Before the sun went down,
"Cheery, Cheery, Cheery"—*(Robin call)*
The Robin's voice was blown.
I answered then. He answered back
'Fore far away he'd flown.

Chorus:
So "Cheery, Cheery, Cheery,"
Then I gayly sang.
And "Cheery, Cheery, Cheery"
From the tree tops rang.

Up on the barn roof
With his back to the sun
"Phoebe! Phoebe! Phoebe!" *(Voiced shrilly with nose tightly closed)*
His song had just begun.
I answered him. He answered back
And then his tail he flung.

Chorus:
So "Phoebe, Phoebe, Phoebe,"
Then I called his name.
And "Phoebe, Phoebe, Phoebe,"
Soon his echo came.

Down in the meadow
Just when the sun went down
"Whip-poor, whip-poor-will!"
His feathers, darkest brown.
I answered him. Then answered he,
Across the field new mown.

Chorus:
So "Whip-poor, Whip-poor-will"
In woodlands round.
And "Whip-poor, Whip-poor-will,"
From the nearby ground.

The Last Summer

Illustration by Alice B. Doughten

By ALICE CARVER CRAMER

"A COUNTRY inn in Vermont near nine ski tows." We looked out over our iron balcony railing into the palmetto thicket. The sun was brilliant, but we were well wrapped up against the constant wind and trying to forget that indoors the thermometer had groaned up to only fifty-eight after its morning reading of forty-four. It was so much more comfortable in Vermont in the winter than in Florida!

In May the same seductive hostelry reappeared in the "Personals" column, this time with summery connotations. It was too much. We engaged a room for the summer.

Our last night in Florida we spent with friends. After dinner we stretched out in lawn chairs on a terrace overhanging the smooth, black Hillsborough River. A monster live oak filled the sky above us, a vast tropic moon caught in its leaves. Mullet jumped and fell, smacking the water sharply. Across the river, somewhere near a gaunt eucalyptus, a chuck-will's-widow mourned in softer, reedier imitation of the whippoorwill. All was softness and freshness, balm after the stupefying dazzle of white heat we knew by day. Now that we were about to leave, we felt how much we loved it all—the very strangeness and foreignness, the lushness, the violence.

By six the next morning we were off, for we wanted to use every moment of coolness in our two-hundred-mile drive north and east across the peninsula. Out of the intense and sparkling sky buzzards dropped in congregation on the body of a range calf by the roadside. The poor creature was bloated out of likeness to its scrawny normalcy, its legs thrusting stiffly like those of a toy pig. Beyond the road great cypress forests, in winter so stygian, stood in green as fresh as that of larches.

By the time the heat grew suffocating we did not care, for we and our car were boarding the steamer, ready for voyage.

Jewel-green banks cut in a hundred points and recesses fell away beside us to the heartening music of the engines. The St. John's River was level, the banks were level, and the pale clouds were level. Slowly and deviously we went, moving into these motionless planes. And then at sunset the open sea showed ahead. Great clouds suddenly sprang up in dense masses, apricot and jade, purple and mauve and brown, crisscrossing and changing as they were swept by different wind currents. Nearby the sky darkened against the backdrop of this effusion of color, and a singing, golden shower enveloped us. The river dimpled and whipped. It was the first rain we had seen for six burning weeks, and we could not bring ourselves to leave it. Indeed, the deck was hardly wet, for the storm swept whirling on, while a rainbow was left rising out of the river just beside the boat and moving steadily with us.

Now a low sea wall of gray rocks appeared, tapering out into the gray ocean ahead. Three figures were on it. Were they children? But suddenly, startlingly, they were lost, and the wall was lost, for the sun, with all its lavish light, was gone, violently, as is the

way in the sub-tropics. We turned into the Atlantic and the night.

Five days later we left a country road for a lane curving steeply down to a brook. Over the brook, up a little hill, and we halted at the door of a plain Vermont farmhouse. It had not a scrap of pretension, no grace of carved lintel nor of fanlight, no charm of flagged terrace. But it was set in the green hillside with a slope of green grass at the door. An elm and three maples shaded it, and the steep walls of the little valley sheltered it. Below, across the hayfield, the eye was drawn down to the broad Connecticut Valley, but as irresistibly returned to the snug location, the solid house. It was there, and it was white.

At the woodpile was a tall young man who revealed himself as our host. No wife, mother, or sister appeared to help him settle us. He took us through the kitchen to our room with its iron bed and new Vermont Industries blankets, its fireplace flanked by logs, its heavy writing table and modern kerosene lamp. Three windows opened into the surrounding greenness.

Still no hostess; and now our host's booming voice summoned us to supper. We went with some internal questionings. The table was laid in the kitchen wing, and there we found a tremendous wooden bowl of lettuce from the garden, fragrant not only with a breath of garlic but with herbs that had lived in their window bed an hour before. At the other end of the table stood the remains of a great rib roast, rare and tender. Between were dishes of the farm's honey, Vermont cheese, homemade bread and cake, a pitcher of goat's milk. We ate and were content.

As we lingered over our fruit our host excused himself to go for the sheep. We were to learn to take matter-of-factly this amazing bachelor's infinite variety of abilities; he was farmer, stock-man, carpenter, tractor-man for his neighbors, handyman, besides cook, baker (we never tasted bought bread or pastry in his house), kitchenmaid, chambermaid, and proprietor. He was bee-keeper and partner in a nearby maple orchard. He was a connoisseur of auctions, where he collected organs and wall clocks. Now we followed him, magnetized by his purposeful air and by the greenness at the door. You have to come from Florida's semi-desert, where the green that you do see is overbright and somehow unreal, to appreciate the greenness of Vermont in a wet June.

Around a grassy corner we came upon a silver barn leaning a little towards us on its stone foundation. Within, high walls of hay caught and kindled the late evening light. From out of the misty valley swallows dipped, bending their wings to enter the door, constantly going and coming. Now sheep bells grew loud and the flock tumbled down through the steep thicket and thudded into the barn and their pen within. The black and white sheep dog flung himself in the doorway triumphantly, his tongue far out, his sides heaving. The barrel-like pup panted alongside after a moment and flung himself down in exact imitation; as though he had had anything to do with it. The long faces of three sheep poked out, their mobile lips drawn back inquiringly, but they dared not advance. Now came our farmer striding in to pen them up. He bent over in that last rich light, to commend his dogs. Swallows still came and went in the gathering darkness, suddenly emerging or vanishing in lavender dusk. It was a Dutch painting in all its detail, its composition, its light. But no, it was Vermont.

And then from the thicket lately so raucous with sheep and dogs and man, came all at once the wheeling music of a veery.

We forgot sheep, dogs, and man.

While we could miss egrets with black legs and golden feet, or little rosy ground doves, or our mockingbirds, so debonair and pugnacious on the lawn, so ravishing in their confident cascade of song when the moon is full—still, the veery is a thrush, and there are no birds like thrushes.

In this valley we had not only the evening veery beside the barn, but a dozen hermit thrushes far up in the hemlock woods of the two ridges, and also for the greatest good measure, one wood thrush that sang at a little distance. Once in June twilight we heard two hermit thrushes singing back and forth, one nearby, one far away, while between and underneath their rippling intangible song came the soberer, more sustained four perfect phrases of the wood thrush, quietly over and over. It was the magic of flutes and one perfect oboe, the familiar magic of rests in music, that punctuation of rhythmic sound with rhythmic silences.

There were a dozen occasions that we shall have forever in our memory. There was one morning in early July when all our world was drenched with light, penetrating rain, and a hermit thrush by some vagary came down from the ridge and flew within a few feet of the house, his progress marked by the phrases of his singing. We could never see him, but heard him now here, now (Continued on page 108)

Inspiration

By RUBY STOVER

From marshes brown the mists arise
The quiet air to fill,
The while I weave a winding trail
Across a dew-drenched hill.

And ofttimes in the early morn
As on those hills I've trod,
I find myself like one new-born
So close I feel to God.

I'm one with silver lakes I see
In lowlands green and fair—
I'm one with lofty maple trees
Their arms upstretched in prayer.

The muskrat brown, the bird, the bee,
The squirrel gray, the sod,
The sun, the wind,—are one with me—
We all are one with God.

In 1912, David E. Lantz, Clarence Birdseye and James Silver, members of a Biological Survey field party, boarded at the log cabin of Tom Coleman near Jefferson, Colorado. Tom, a bachelor and now 79, still lives there. Textbooks and scientific names mean nothing to him, but he knows wildlife and its habits better than some naturalists. He was host, over a period of years, to barn swallows, rare at his elevation of 10,000 feet. Tom has put his observations in writing in this simple and affectionate story, and we publish it here as he has written it. At the right is Tom with a white-shirted "dude" visitor. He seldom leaves his mountain cabin but each Christmas brings him more than 300 greeting cards. He has made many friends, and when he makes them, they stay made.

The Lives of Two Sweet Little Swallows

By TOM COLEMAN

In 1937, two little copper-breasted swallows came to my little mountain ranch or homestead about May 15. I did not give them much attention at first, but after seeing they were red-breasted, that attracted my attention more, as I had never seen a swallow of that kind. Each day they would fly around and catch bugs and look the location over, and when they got their fill of bugs, they would light on the top wire of my garden fence to rest, and every day they would make the fence their resting place. About May 25 they started to build their nest, for which they used mud, grass, and horse hair. But even when they were building their home, they would take their rest each day, and their resting place being only a few feet from my door, I set in to tame them, as it is a very easy matter to tame anything with kindness and love.

At first, I could not get up near them, but each day I would talk to them telling them how sweet and pretty they were, and in a short time I could get up to about two feet of them and tell them how much I loved them and what sweet little fellows they were. In time, I believe they thought this was a part of their business and also mine.

When they finished building their nest, it was not like that of other swallows. They did not put a top on or build a neck to their nest like the white-breasted swallows, and they did not finish the nest up for about a week after building it, but let it get absolutely dry. Then they lined it with pure white, fluffy chicken feathers. Then the little mother bird laid her four little eggs, which were about the size of a pea. When the eggs hatched, the little baby birds were about the size of a bee. You would wonder how the little things could live, but they do, and not only that, but in the five years that the birds nested in my barn, they laid twenty-five eggs and hatched every one of them, and there was not a runt in the twenty-five young.

In the year of 1938, the same two little birds came back and used the same nest they built the year before, and they took every one of those feathers that they left one at a time very high in the air, then they would drop them and you would think they had forgotten them. But not so; they would dive under the feathers, catch them in their mouths and take them to their nest. And this year, 1938, the little mother laid her four sweet little eggs and all hatched. Here is the way they protect their eggs and their young. When the mother bird finishes laying, they do not change off as most other birds so the mate can set on the eggs while the mother feeds, but the male swallow takes all of her food and water in to her while she is setting, and the only time the mother bird leaves the nest is in the heat of the day when she will fly around to rest herself.

And when the eggs hatch out, the male will still feed the little mate, and she takes the bugs that he brings and cuts them up into small pieces for her babies. When the young are two or three days old, the mother cleans out the nest and this she does every morning until the young get ten or twelve days old. Then, either she teaches them or Nature so fixes it that the young throw all of the waste outside of the nest, and even away from the nest. Then the mother bird helps feed the young until they are large enough to leave the nest, and this all goes on the same every day. The old birds still feed the young for about three days, but the young do not lay down on the job. The first day they do not get far away from the nest, but they will fly from place to place. But the next day, they will even get far enough so that they

get out of sight. But each day, they are every one in before sundown, but bright and early they are all out to give those little fellows' wings strength. And this they will do for a week or two until their wings get strong enough to make the trip to their south home, where most of the swallows spend their winters.

In 1938, this first brood of young birds the old ones took away after they thought their wings were strong enough to make the trip, and I thought they were gone for good, but not so. The two old birds came back in about a week and the little mother bird laid four more eggs and hatched every one, but it got pretty cold before the young got away to their winter home. But notwithstanding that bugs were not so plentiful in the air, as everyone perhaps knows that the swallow gathers all of his feed from the air, they made it and all left safe and sound.

Tom Coleman's cabin—twelve miles and seven barbed-wire gates east of Jefferson, Colorado.

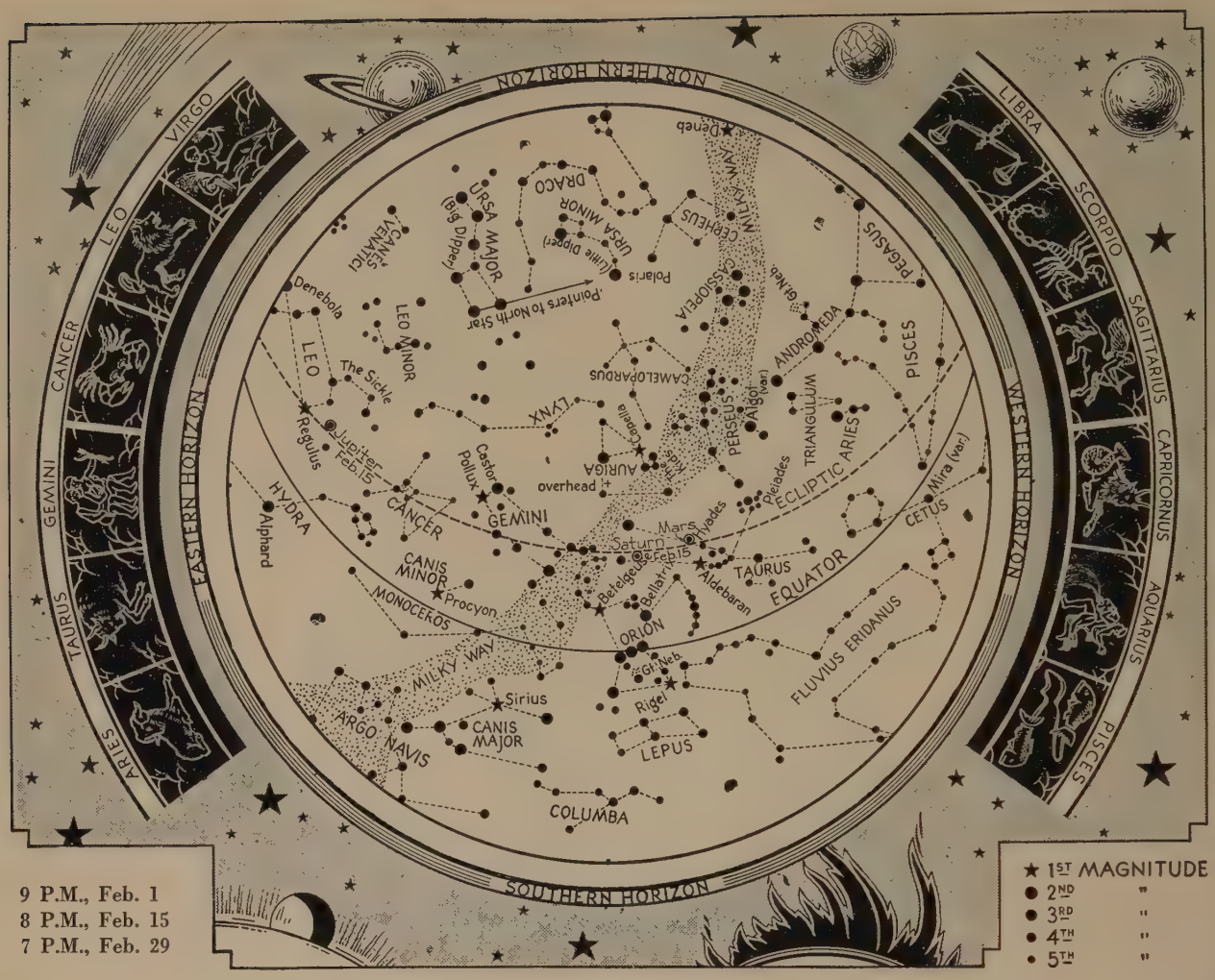
The little mother bird came back rather early in May, 1939, without a mate. Something happened to the dear little fellow. Perhaps some bad boy, or even a man, had shot him, or maybe he died, but was I glad to see even that one come back, and that little thing was just as happy to see me. I would put in extra time talking to her just as I would to a little friend, and I would say, "Well, you won't raise any little babies this time." But she fooled me, for she laid five eggs and hatched everyone and raised five pretty little birds. There were hundreds of the white-breasted swallows that had nests in a rock cliff, but she never mated with them and every one of her young was true to Nature and no cross about them.

But after those little birds hatched out, if you ever saw a busy little mother she was one, and here is the way she worked it. When she went out to get food, she would do this in the heat of the day, and she would cover those eggs with feathers until she would get her breakfast, which would not be very long. But when those little birds hatched, then was her busy time to keep the little fellows eating and to keep them from freezing. It took a great deal of thought and good judgment, and this is the way she worked that. She would cover her little babies with those white feathers, go out and get her mouth full of bugs, and you would think she would give one bird the whole amount of food that she brought, but not on your life. She would divide it with them. Then she would sit on them about a half hour and warm them up, and, of course, cover them as before. This she kept up until they were large enough that each one would take a full mouthful, which of course, took less of her time, and the extra feathers would keep them warm until the heat of mid-day, when she did not have to use them.

When those little birds came off the nest, and all lined up on a pole, I think she was the proudest little mother that I have ever seen. I was sitting out there, looking the pretty little fellows over, and they were real tame. Every day I would go in the barn and talk to them and love the little fellows. *Who* would not love a little bird?

The old mother bird came back in 1940 with a new mate, and they raised a family as before, and it is strange that out of the twenty-five young birds that left the nest in my barn during the five years, not one of them ever came back that I knew of. Only two at a time came back, but in 1941, the first little mother bird and her second mate came back and hung around for about a week, and the weather was so cold that they left. In about two weeks, the little male and a new mate came back. It would have made five years for the mother bird had she returned the second time. Of course, the new little mother never got so gentle as did the first one that came in 1937, but they raised their four little ones and left with them about September. But something must have happened for about September 15 the little male bird came back, something that had never happened before in the five years. He put in the afternoon flying over the place and went in the barn to camp for the night, but was gone when I got up next morning. And it is strange that about October 1, he came back again alone and, as before, looked over the place. But by this time of the year the nights get pretty cold at this altitude, so I closed the barn door so the little fellow would not get cold but next morning when I opened the door, he headed South.

I have made an attempt at writing this story in hopes that it will be in some way the means of saving the lives of some more little birds. If the boy, or man, or whoever it may be, only knew what friends these little swallows were to the human race, I am sure that they would never kill one or even destroy one of their little nests. But for the birds, you could not live on earth, for the insects would destroy all.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south. Time given is Standard Time; add one hour for War Time.

Earth-Shine on the Moon

By ISABEL M. LEWIS

For a few days before and after the date of new moon, when the crescent moon is shining in the east before sunrise or in the west after sunset, one may usually see that beautiful lunar phenomenon known as earth-shine, or, as it has been called, "the old moon in the new moon's arms." The crescent is that portion of the day side of the moon that is turned toward the earth at this time, and its light is that of sunlight reflected from the surface of the moon. The remainder of the surface of the moon turned toward the earth is the part unilluminated by the sun's rays—the night side of the moon. Only a small part of the surface of the moon that lies on its night side is not visible from the earth at this time, and it is equal in area to the illuminated crescent that is visible.

The large portion of the night side of the moon now turned toward us is seen to be illuminated by a faint light that makes visible the entire disk of the moon exterior to the crescent. This is the light known as earth-shine. If it were not for the glare of light from the lunar crescent it would shine much more brilliantly than it does. As the crescent gradually increases in size, and its light becomes stronger, the earth-shine on the part unilluminated by the sun's rays gradually disappears, blotted out by the stronger light from the crescent.

Earth-shine is light reflected from the day side of the earth to the moon and it falls upon the night side of the moon and illuminates it, just as the night side of the earth is illuminated by the light of the full moon. Viewed from the moon the earth also has its phases. At any one time the earth phase is the opposite of that which the moon exhibits. The earth is

very nearly at the phase of "full earth" when the crescent moon and earth-shine are visible to us. At the exact time of full earth we cannot see the moon then fully illuminated by earth-shine because it is directly between us and the sun. The only exception is at the time of an eclipse of the sun, when the moon throws its shadow across a large part of the day side of the earth. If one were standing then on the night side of the moon facing the earth he would see the magnificent spectacle of the shadow of the moon traveling rapidly across the huge rotating globe of the earth. While anyone on the earth in the moon's shadow would see the entire night-side of the moon.

Viewed from the moon the earth exhibits a disk about four times as great in diameter, and about fourteen times as great in surface area, as that of the full moon. Measurements of the intensity of earth-shine on the moon have been made. It has been very difficult to obtain accurate estimates for there are many things that affect the results. They indicate that earth-shine is *from forty to fifty times* more brilliant than moonlight. Only a part of this great intensity of earth-shine as compared to moonlight is due to the fact that the area of the earth's disk, and therefore the reflecting surface, is fourteen times that of the lunar disk. The reflecting power, or albedo, of the surface of a body has a great deal to do with the amount of sunlight that it reflects. The albedo of the earth's surface can be determined from measurements of the brightness of earth-shine. It has been found to be about half way between that of bodies such as Moon, Mercury, and Mars, which have little or no atmosphere and dark surface areas, and bodies such as Venus, or some of the outer planets, with dense cloud-filled atmospheres and great reflecting power.

The day side of the earth, the source of earth-shine, varies greatly in its albedo in various regions. It is covered in large part with oceans that brilliantly reflect the sun's rays, and with large polar caps of snow and ice, also of high albedo, as well as an atmosphere always filled to some extent with highly-reflecting clouds. On the other hand there are large tracts of vegetation and tropical jungles and mountainous areas of low albedo. A temperate zone in winter covered to a great extent with snow has a much higher albedo than in summer. On the whole, the albedo of the earth is much higher than that of the moon. It is this high albedo of the surface of the earth, as well as its great area compared to that of the moon, that makes earth-shine forty to fifty times that of the light of the full moon. Compare with that the light of the solar corona, estimated to be about *half as bright* as the light of the full moon, which shines so brilliantly during a total eclipse of the sun! Earth-shine is nearly one hundred times brighter than the solar corona.

Earth-shine may be considered to be a gauge of weather conditions on the day side of our planet, and of the relative reflecting power of different parts of the earth's surface. The albedo of the regions that have rotated into view of the night side of the moon would determine the intensity of earth-shine as we see it. A vast expanse of the Pacific Ocean and numerous clouds, if turned toward the moon at its crescent phase, should give a more brilliant earth-shine than the continents of Europe and Asia in the northern summer, the equatorial vegetation of Africa, and the great desert regions to the north of it, all of which have a low reflecting power.

Earth-shine varies greatly from month to month in brightness, as would be expected. There are months when it is barely perceptible. There are, again, times when its brilliancy is quite startling in its splendor. At times there appear to be localized areas on the surface of the moon where the earth-shine is exceptionally brilliant. Now that so many of us are up before sunrise, the waning crescent moon is receiving more than its usual share of attention. It will be interesting to compare earth-shine on the moon during the few days that precede the date of new moon with that visible a week or so later, when the new crescent moon exhibits the same phenomenon in the western evening sky. There are times, as happened not so long ago, when earth-shine at the waning crescent phase several days before new moon is exceptionally brilliant. There are occasionally times when it may be seen on the moon close to the time of first and last quarter, but this is unusual. The phenomenon is at its best within three or four days of new moon.

The observations have shown that the part of the moon's surface that is illuminated by earth-shine is bluer than the part illuminated by direct sunlight. This is to be expected because much of the light reflected from the day side of the earth to the moon comes from the upper atmosphere and consists chiefly of radiations of short wave length or blue light. Photographs have been taken of earth-shine on the moon but special care has to be taken to obtain such photographs, as the light from the sunlit crescent is very brilliant and with ordinary exposure, aimed to show the crescent to best advantage, the earth-shine will not appear at all on the photographs.

Three planets will be visible in the evening sky this month—Mars, Jupiter, and Saturn. Venus and Mercury are in the morning sky.

On February 11 Jupiter will be in opposition to the sun and will rise at sunset on that date, pass the meridian at midnight, set (Continued on page 108)

Entomological Emotion

By PAUL CHURCHER

Moon moth, night-flying Luna,
Of pale green wings and slender tail, you are
Companion to the night wind's restless sweeping;
To summer dark; to every cool, bright star.

The School Page

By E. LAURENCE PALMER

Professor of Rural Education, Cornell University, and Director of Nature Education, The American Nature Association

YARDS AND "YARBS"

ABOUT this time of year, many persons begin to think of the gardens they will have next summer. Seed catalogs begin to appear in the mails. Nurseries announce pre-season sales.

This year, many gardens will be much different from what they have been in the past. We will have to raise more food to feed ourselves and our allies. But "man does not live by bread alone," and many a slice of bread is made more toothsome by a sprinkling of poppy seeds, of caraway fruit, or by other flavoring ingredients that have been raised in gardens. There is some excellent geography associated with learning about the raising of many of the so-called "yarbs," and the special insert in this magazine should bring out how and why many flavoring and drug substances are absent. Some, through our indolence, have been raised for the most part in foreign lands. Here is social science and biological science meeting on a common ground. The schools should witness this meeting because in the future it is hoped that the picture will be different.

Activities schools might undertake include the making of collections of substances flavored, made fragrant, or otherwise modified by herb products. See the insert. This should lead to some sense-training activities involving the ability to smell, taste, or otherwise detect the presence of such things as pennyroyal, anise, caraway and the like in commonly-available substances. A few cents worth of many of these things purchased at the drug store should yield worthwhile returns in discovering which members of a class have superior ability to taste and to smell. Some of these substances are not processed at all and might be used to start little gardens, either in the school room or in some appropriate place in the schoolyard. The plants need not be carried through to maturity necessarily, but some may wish to do this. If the seeds are unavailable locally, a list of dealers appears at the end of the special insert.

Select Wisely

The teacher should use some discrimination in the selection of herbs to be raised by children of the different grades. Many of the plants considered as "yarbs" have seeds and other plant parts that are poisonous. Few of these plants are dangerous to touch, but some, like Jimson-weed, have fruits that might look tempting to an inquiring child.

While studying the effect of various poisonous and drug plants on human health and behavior, the teacher may feel that it is desirable to canvass the community population to see what "old wives' tales" dealing with the use of local plants in the treatment of disease are still accepted as valid by some groups of the population. A doctor might be willing to check these tales collected by the children with the accepted lists of official drugs recognized by his profession. Old almanacs, old newspapers, local museums and historical societies should yield information that will make the study of locally-grown or native plants more interesting.

The general science teacher who is beginning to do some work in simple physics or chemistry should welcome the herbs as a practical way of showing what is meant by tinctures, solutions, mixtures, precipitates, sediments, emulsions and the like. The extraction of important substances from the herbs by heat, distillation, by water, alcohol and by mechanical pressure all demonstrate a wide variety of techniques useful in understanding the nature of matter. The use of different solvents in extracting substances adds further interest to this study. It should stimulate a few youngsters to wish to apply the same techniques to strange plants to see what will happen. From this might arise an interest in the dyes that are extracted from some plants by practices similar to those employed with medicinal and other herbs. It is probable that a later unit of this series of inserts will deal with the dye problem, particularly as it relates to native plants of the United States.

A few children may come from homes where herb collection, culture and processing may be carried on as a side-line. This may open up new studies in the variations that exist in different strains of plants, how some bear a greater abundance of the desired elements, are raised more quickly or with less effort than others, or yield a superior quality of the desired product. The procedures involved in collecting and drying plant parts at just the right time and in the right manner should help the teacher of biology, who may be studying or teaching something of plant physiology and the more important changes that take place in the different stages of development from seed to seed. Of course, the market value of many herbs is dependent on the preliminary processing of the plants.

Flavored Lunch

A school lunch enriched by some of the flavoring herbs raised locally might appeal. Furthermore it might stimulate the children and their parents to consider the growing of these plants in their gardens, either as a serious venture or incidentally. A survey of the local gardens to see how many of them boast a patch of peppermint, spearmint and similar plants might stimulate the owners of other gardens to establish similar patches to satisfy their own needs. A school garden venture might well serve to supply many interested gardeners with initial stock in the form of slips, root cuttings, seeds and the like, and result in a widespread interest in growing back yard herbs that many may have thought could be had only through the drug store.

Some teachers may be interested in getting their children to go through lists of quotations to find to what extent herbs of the type here considered are used in general literature. The witches' brew described by Shakespeare in *Macbeth*, and quoted briefly in the insert, is a case in point. Where, in other writings of Shakespeare, in the Bible, or in other literature, did the authors use real or supposed properties of herbs for the development of the plot?

In classes in geography or history, interesting lessons bearing on herbs of the type here considered may be developed from the accounts of the travels of Marco Polo and other early explorers. In the days when exploring was done without the assistance of a trailer, the travelers were forced to carry only the things that occupied little space, weighed little, and yet were capable of great influence. Medicinal and aromatic herbs shared space with jewels and the

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seeds of strange or useful plants. Even today, when we are learning to concentrate foods to save shipping space, we are following the lead of early travelers. The fact that most imports of herbs are in a highly concentrated form should be taken into consideration when studying the weight of imports. A ton of caraway seed may weigh the same as a ton of potatoes, but it will serve its purpose to many more people for a longer period of time. In the tabular material in the insert, are figures dealing with the number of seeds per ounce of certain species. Also there are figures for the number of plants raised per acre, the spacing of these plants and the amount of seeds necessary if the species is drilled in lines, sown broadcast or transplanted from seed beds. These figures are important to those who may be interested in raising the plants, either in the home yard or in the school yard, particularly when high-priced and relatively rare seeds are involved. Incidently, this should suggest some excellent arithmetic problems to the alert teacher or to the practical herb gardener.

Herb raising has many practical angles that should be remembered by the person who starts to raise the plants expecting to become rich overnight. There must be some assurance that the necessary labor may be available to meet peak loads during the period of cultivation and harvest. There must be some assurance of a satisfactory and sustained market near enough to avoid paying all the profit in transportation. There must be recognition of the fact that for the most part there are no standardized procedures for combatting insect and fungus pests such as are known for the more common garden plants. A spray on a typical food garden plant may do no harm, but on a highly valuable medicinal herb it may prove destructive. For these reasons, and for many others, those going into herb raising should not expect too much. It is possible that some may be highly successful from the economic standpoint. It is probable that more will get their satisfaction chiefly from raising bizarre plants for the sake of catering to unusual needs and appetites. If the teacher likes to raise little orange trees from orange seeds indoors, or to try to sprout avocado pear pits in flower pots, the chances are that the same teacher will experiment with raising novel, exotic plants such as these "yarbs" in the school yard.

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TRAIL SIGN

By Louise Huston

An Indian trail sign is located on a hill overlooking the Ohio River, in Huff township, Spencer County, Indiana. This trail sign is about half a mile from the river at an elevation of perhaps five hundred feet above low water. The bearing is north-northwest. Passing by it are traces of an old wagon road, leading down to the town of Macville, at the mouth of Anderson Creek. The trail evidently followed the high ground between Anderson and Crooked creeks, as other trails and roads were often cut off by high water.

It is more than a possibility that Tecumseh followed this trail on his trip to the southern Indians just before the battle of Tippecanoe. It is certain that Abraham Lincoln often passed by this trail sign on his visits to home folks, fifteen miles back from the river, when he was working for James Taylor at Macville. Taylor owned a farm on the east side of Anderson and a store at Macville on the west side, and this gave rise to the legend that Lincoln at one time ran a ferry there.

The ferry was licensed by Taylor but little used by the public, and was merely a convenience connecting the farm and the store. Lincoln was a "hired hand" doing whatever chores were needed, including running the ferry back and forth across Anderson. It was never used to cross the Ohio, although Lincoln may have used a "dinkey boat" to take a passenger out to a steamboat.

He was then sixteen years old and worked with James Taylor's son, Green B. Taylor, who was fourteen. Of course there is the story about their quarrel over the red ear at the corn husking. Not long afterward Lincoln moved with his family to Illinois. Green B. Taylor grew to manhood and owned the farm which is still known as the Green Taylor farm. It now belongs to Edward Lorch, an Evansville attorney, a lineal descendant of James Taylor.

V-GARDEN STARS FOR 1944

(Continued from page 93)

but its stems and leaves are finer. As a substitute for spinach, or rather a supplement to spinach and other midsummer greens, it seems to offer real possibilities. For one thing, it stands hot, dry weather like a camel, and, when it rains, starts to grow again. It does not bloom or go to seed like spinach, and the flavor and texture are just as good—possibly better. My own family preferred it to Swiss chard, finding it a little more interesting in flavor, but then my family does not like chard. Tampala seems to be a really new vegetable with a future.

Walker Prizes

Established by the late Dr. William Johnson Walker, two prizes are offered annually by the Boston Society of Natural History for the two most acceptable papers on a subject chosen by the Trustees. The first prize is sixty dollars (it may be increased to one hundred in case of exceptional merit) and the second, fifty dollars. The subject for 1944 is reptiles and must be the result of original and unpublished research conducted by the author. The contest closes May 1, 1944. Full details may be obtained by sending a stamped, self-addressed envelope and request for information to the Boston Society of Natural History, 234 Berkeley Street, Boston, Massachusetts.

Another Big Oak

Another report about a big oak comes from Long Island, New York, in response to the note in our November issue. This one, reported by Mrs. M. K. Kortright of Huntington, is located on the Lloyd Harbor Road about eight miles from Huntington Village. It measures nineteen feet around the trunk at five feet from the ground, and the span of its branches is 130 feet. It is believed to be about 450 years old.

Clarence Hawkes

When he was nine years old Clarence Hawkes of Hadley, Massachusetts, lost his left leg just below the knee; when he was thirteen he lost his eyesight. That would have been enough to stop most of us. But not Clarence Hawkes. He entered Perkins Institute for the Blind at fifteen, graduated four years later, and at twenty was a Chautauqua lecturer. He gradually withdrew from the platform to devote himself to writing, and in the last forty years has written fifty books and many poems and essays. His enthusiasms range from cribbage to baseball, but his major interest is Nature and working with young Nature enthusiasts. Of this interest the late William T. Hornaday wrote:

"Here is a born Nature-lover, the woodsman, the chronicler, and the painter of mental pictures, who for a few brief years looked into the pulsing heart of Nature, focused his mental camera upon her during a few brilliant days, and then suddenly, with a stroke of lightning, the world became dark. . . . With marvelous fidelity, he paints what he has seen and yet remembers, and for the rest he gathers his share of wild animal lore."

Recently, on the fiftieth anniversary of the accident that robbed him of his sight, Dr. Hawkes was honored by his fellow residents.

Oriole Nest

Miss Minnie Gibbs of 124 Crestmoor Avenue, Louisville, Kentucky, teaches the third grade and is one of the curators of the class museum. She is eager to get an oriole's abandoned nest to add to the collection.

SQUIRREL ADVENTURES

By Henry S. Curtis

The account of a woodchuck tapping a maple tree that appeared in a recent *Reader's Digest* interested me as I have often observed squirrels tending their sugar bush. The maple furnishes much of their food in the spring of the year. Some few springs ago, I watched a red squirrel in his rounds for some time. In tapping a tree, he bit into the lower side of the limb, usually quite near the trunk, in this way tapping several limbs on the same tree, then he would go on to the next tree, where this operation had been performed some time before, and a drop of sap could be seen hanging from the limb. He would drink each drop of sap rapidly and then pass on to the next limb and the next tree. He was a real conservationist, and did not bleed any tree overmuch.

I was much interested some time ago in watching another pair of red squirrels gathering their fall crop of acorns. It was early, before the acorns were falling much. The crop was poor and they had selected an oak tree about two feet and a half in diameter and seventy-five to eighty feet tall for the harvest. Most of the acorns seemed to be in the top branches. For several minutes they worked steadily, biting off the acorns and dropping them down so that it made quite a patter on the autumn leaves. This process was of great interest to a pair of chipmunks that had their residence beneath the tree. As fast as the acorns were thrown down, they gathered them rapidly and carried them into their hole. This escaped the attention of the red squirrels until they had been working for some time. But when they discovered what was going on, they came down from the tree like a whirlwind and drove the chipmunks into their hole. Then they went back up the tree and began again. The chipmunks came right out and began to carry off the acorns. Without waiting so long this time, the red squirrels came down again and drove the chipmunks again. But it now became apparent to them that the strategy of this enterprise was all on the side of the chipmunks. With less delay than sometimes occurs in human warfare, they revised their method. They went back up the tree; but instead of throwing the acorns down, they came down with them, carried them across the road and up into the hollow tree where they were storing them and came back for another load, giving the chipmunks a little chase each time they appeared. Their language meanwhile indicated that they were calling each other names that were not fit for publication.

Farm Forests

Farm Forestry in the Eastern United States. By Joshua A. Cope. Washington, D. C. 1943. Charles Lathrop Pack Forestry Foundation. 40 pages. Illustrated. Free.

Based on research made under a fellowship grant made by the Charles Lathrop Pack Forestry Foundation, this report is a study of the methods used by public and private agencies to interest farmers in the proper management of their woodlands. It reflects the tremendous growth in emphasis that has been placed on the development of farm forests and woodlots during the past ten years. Farm forestry includes not only the growing of a woodlot for the farmer's use, but farm forests as windbreaks, shelterbelts, and a source of supplementary income. Such forests lend themselves particularly to planned cutting so that the forest may be maintained and extended, and continue indefinitely to serve several vital purposes. This publication is of interest to farmer and forester alike.

Fishes of the North

Northern Fishes. By Samuel Eddy and Thaddeus Surber. Minneapolis. 1943. The University of Minnesota Press. 252 pages. Illustrated in color and black and white. $4.00.

Treating with more than 150 fishes characteristic of the upper Mississippi Valley, this book is of outstanding interest and practical value to fishermen, students of fishes and conservationists. Introductory chapters deal with fishing, fish production and management, lake and stream improvement, fish structure, classification and origin of fishes, and other foundation material. Then follows discussion of the various fish families that have representatives in the great fishing country of Minnesota, Wisconsin and Michigan. Consideration of the families and the individual species includes material on identification, habits, distribution and the significance of the fishes as food or game species. Dr. Eddy is a member of the staff of the University of Minnesota Zoology Department, and Mr. Surber has for twenty years been superintendent of fish propagation for the Minnesota Department of Conservation.

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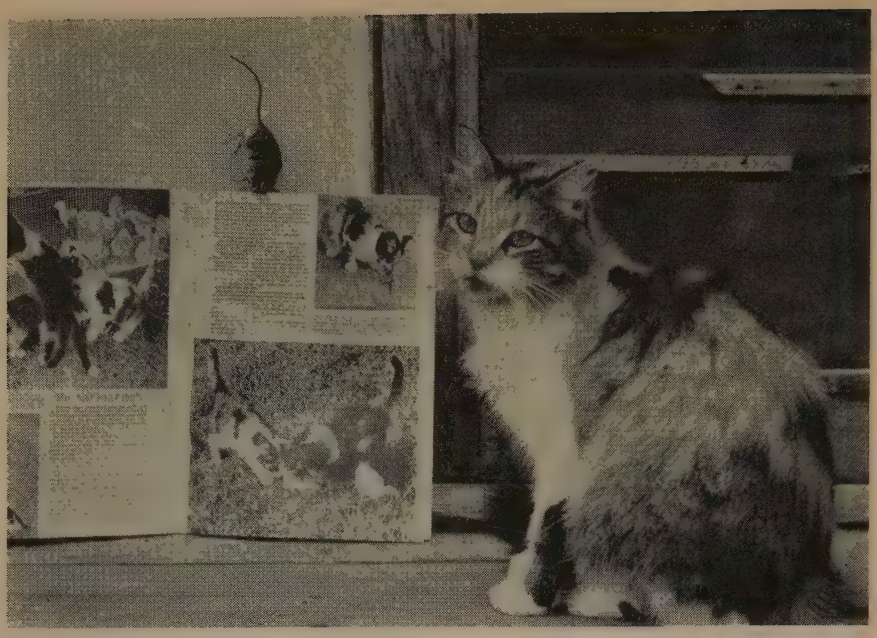


Word from Mrs. Katt

Dear Sir:

Mrs. Katt and I wish to thank you for sending us the copy of *Nature Magazine,* compliment you on the nice quality of the reproduction, and the judicial attitude assumed. She points out that she is a predatory cat only when she has kittens, and at other times does no hunting to speak of, beyond keeping our premises free from rats and mice.

I had hoped to use the mouse in the picture I took of her to send to you but she refused to hold it in her mouth or touch it. This mouse she had brought in earlier in the day and presented to us. When she has no family she always brings in anything caught, calls us with a distinctive sound that resembles the cry of a sandhill crane, and drops it when we appear—and thereafter is not interested in it.

While on the subject I might as well say that Mrs. Katt recently performed a real service for us. A woodpecker had been ruining the fruit on a young Washington navel orange yard tree. The little tree had four or five dozen oranges on it, and before we realized what was happening the woodpecker had ruined over half (they drill a hole in the fruit—presumably for a drink—and are considered by orchardists here as very destructive.) I laid for this bird but could never get a shot at him. One morning Mrs. Katt woke us at 5 A.M. and laid a woodpecker on our front porch! Since then no more of the fruit has been ruined, so I guess she got the right bird.

EDWARDS H. SMITH.

After the above letter had been put in type we received a sad postscript from Mr. Smith. Under distressing conditions, Mrs. Katt has died. Caught on a hook of a set line, she came home after three days absence, weak and the hook far back in her mouth. While convalescing, but still far from herself, she asked to get out of the house and was set upon and killed by two roving terriers.

Test for Duty

From a letter by Private Leighton Harris to his wife in Massachusetts written while waiting to be relieved as Acting Corporal of the Guard during basic training in a southern camp:

"After spasmodically sleeping in the shack all night while my three sentries walked their two-hour beats on this filtration dam post, I took a stroll out in the sun and quiet, across the little wooden footbridge, and down along the far shore of this small river. Naturally, I had been drawn by the sound of birds, but I told the swarthy Italian sentry whom I passed that I was just looking over the post.

"No chickadees or magpies showed up all the way down along the shore—only a couple of busy gray squirrels. But on the way back, a lively song spouted up out of some nearby brush, and the notes were echoed by a distant companion. On a brush bough above me within a few yards popped a little four and one-half inch bird—tail cocked high—soft clay brown back—light gray underside—long bill—and streaks of light through his eyes.

"For five minutes he sat there and shot his melodious wren-like songs into the air, always keeping an eye on me. Two or three times he gave out with neat short trills. Then he chirp-hissed the warning notes of a bird who is startled near its nest. Next he switched his stops back to music and sent wave after wave of song high into the trees. Somehow it seemed as though he was working his hardest to please me, personally. As though he knew me when I used to stand on a wooded New Hampshire path and wait for a warbler to sing its fill.

"He looked like a wren—perhaps a Virginia wren. I shall look him up in the Service Club library tonight.* It really matters little what he was, but for what he did to my 'euphoria'—and to my heart—I sent a little prayer of thanks in the usual direction. Perhaps the 'Receiver' will see to it that my little 'wren-fren' gets a few extra juicy bugs on his next forage. . . .

"Upon returning via the footbridge, I again met my swarthy colleague leaning on his rifle, and I braced myself against his scorn as I told him of the bird and the song. He responded as I might almost have guessed.

" 'You like boids? When I was a kid in W——, Massachusetts, we used to go out and shoot 'em with sling-shots, y'know, sight 'em and shoot 'em good. We had fun.'

"So my interest excused itself for a minute and never returned. It came here inside the shack to write to you.

"But for a moment it seemed to me as if a good way to separate the front line soldiers from the services of supply would be to ask all draftees the same question:—'Do you like to shoot birds?'

* P.S. "It was the Carolina Wren —look him up for his song."

Texas Trees

Forest Trees of Texas. Texas Forest Service, College Station, Texas. 4th Edition, 1943. 138 pages. Illustrated. Fifteen cents.

The first edition of this handbook and guide to the forest trees of the Lone Star State was brought out in 1928 and met an enthusiastic reception. Printings were made in 1933 and 1937, and now a fourth printing in enlarged and revised form has been made available. This is a popular guide, with introductory material giving instructions on tree identification.

SURE, that Saturday night pay envelope's bulging. But let me tell you something, brother, before you spend a dime . . . *That money's mine too!*

I can take it. The mess out here. And missing my wife and kid.

What I *can't* take is you making it tougher for me. Or my widow, if that's how it goes. And brother, it *will* make it tough—if you splurge one dime tonight. You're making money. More money than there's stuff to buy. Money that can sock the cost of living to kingdom come—if you blow it! So hang on, till the job's done. On to every last dime—till the squeal means a hole in the seat of your pants!

You're working . . . and *I'm fighting* . . . for the same thing. But *you* could lose it for both of us—without thinking. A guy like you could start bidding me right out of the picture tonight. And my wife and kid. There not being as much as everybody'd like to buy—and you having the green stuff. But remember this, brother—everything you buy helps to send prices kiting. Up. UP. AND UP. Till that fat pay envelope can't buy you a square meal.

Stop spending. For yourself. *Your* kids. And mine. That, brother, is sense. Not sacrifice.

Know what I'd do with that dough . . . if I'd the luck to have it?

I'd buy War Bonds—and, God, would *I* hang on to them! (Bonds buy guns—and give you four bucks for your three!) . . . I'd pay back that insurance loan from when Mollie had the baby . . . I'd pony up for taxes cheerfully (knowing they're the cheapest way to pay for this war) . . . I'd sock some in the savings bank, while I could . . . I'd lift a load off my mind with more life insurance.

And I wouldn't buy a shoelace till I'd looked myself square in the eye and knew I couldn't do without. (You get to knowin'—out here—what you can do without.)

I wouldn't try to profit from this war—and I wouldn't ask more for anything I had to sell—seeing we're all in this together.

I've got your future in my rifle hand, brother. But you've got both of ours, in the inside of that stuffed-up envelope. You and all the other guys that are lookin' at the Main Street shops tonight.

Squeeze that money, brother. It's got blood on it!

Use it up . . . wear it out, make it do...or do without

A United States war message prepared by the War Advertising Council; approved by the Office of War Information; and contributed by the Magazine Publishers of America

MUSKRAT ON THE MENU

(Continued from page 80)

said. "Do you really want me to cook it?"

"If you don't mind. You know you said you'd be willing to cook anything I wanted to try!"

Yes, I had promised, I thought, with the mental reservation that I had not said I would *eat* everything he brought home! So I cooked the muskrat, roasting it as I would pork, with the exception of strips of bacon across the top to make up for the fat I had removed. The wonderful aroma while it was cooking was our first indication that we were going to enjoy our experiment. When we sat down to dinner we nibbled at small pieces of meat at first to try the taste. Later we ate as heartily as we would any roast. The flavor resembles a cross between pork and rabbit.

The muskrat is related to our common meadow mouse and is similarly prolific. With reasonable protection by man, and aided by the reduction of its natural enemies that has attended settlement, the animal has increased enormously in favorable habitats, and yields a good profit to those who have acquired control of marshes suitable as a year-long habitat for the muskrats.

Their flesh has long been eaten by several tribes of Indians, and by woodsmen, and the utilization of this by-product naturally suggested itself. Its use was popularized, especially in the Chesapeake Bay region, more than thirty years ago. Soon muskrat meat appeared in the markets of Baltimore, Philadelphia, Washington and Wilmington, N. C., and probably elsewhere, usually under the name of marsh rabbit, and met with a ready sale. In localities where it is available in quantity during the colder months, muskrat meat has doubtless already played its part in the strained economy of the present emergency.

In the preparation of the carcass for food, one should remove the musk glands and soak the meat in salt water for an hour or so. It may then be fried, roasted or stewed in much the same manner as with chicken.

THE LAST SUMMER

(Continued from page 97)

there, his liquid song showering through the liquid air. He came to the elm by the house and then he circled on, his rainlike music receding, silver and various.

There were mornings of blackness when only the cold, wet smell of the air told the time. Then in the utter silence, far away, unreal, came the song of the hermit thrush as he, too, awoke. Perhaps it was the distance or perhaps that in waking he sang incompletely, but for whatever reason the notes seemed fragmentary and one did not know surely where the ear left off and memory began. It was a dreamlike experience, and unforgettable, until more earthly birds would break in upon this delicate penetration of the night with music.

But there was one cherished evening when we climbed the hillside shortly before sunset, through clear summer air in which the nearer hills and the far blue mountains shone and glistened, until we stood at last in the cave-like spaces under the hemlocks to rest. Then, in the quietness, a hermit thrush came singing overhead. We saw him first a hundred feet away as he sang his mysterious phrase from a hemlock bough ten or twelve feet above the ground. Then, lightly but without haste, he flew to a nearer branch. Another phrase. Again the effortless flight — a floating in air, a drifting among shadowy branches—and again the effortless miracle of song. Now he was directly over us, not ten feet away, and singing. We saw his open bill quiver, his throat and breast vibrate. We neither breathed nor stirred. The next flight inevitably took him a little beyond us. So phrase by phrase and flight by flight, he went on, passing into the darkness of the hemlocks.

We stood enslaved throughout this natural ballet. Amateurs, merely and literally, we yet knew that it is a rare thing to observe so closely the retiring hermit thrush in song. We had seen with our own eyes how the bird moves, the reason, or part of it, for the ventriloquial effect of the song, as it is often called. We wondered at our luck; and indeed the occurrence was never repeated through all the weeks until the music fell away and was gone.

Gone, for us, for that season; and we do not yet know for how many to come. For when the next summer was here, we were in Florida, and America was at war.

Over the phone one night we heard the ringing voice of our Vermont host. He was in the army, stationed nearby, and could he come over? He came, and told us his news. He spoke of the disposal of all his stock—his horses, "Grandma" and the other foolish sheep, the chickens, the goats. The dogs were visiting for the duration. A neighbor was keeping an eye on the place. The better part of his soldier's pay was going to the steady diminution of his mortgage; his eyes lit up when he told us that.

We fed him chicken with Spanish rice, golden with saffron and richly seasoned, and followed by mango sherbet. And we listened to him, an unspoken nostalgia upon us all for the Vermont farm, for the thrushes, for more than these.

Later we heard from him again. And then silence. Where is he now? What of his farm? When shall we know?

But meanwhile we have—and he has—those golden summer months, the freshness, the greenness, the blueness. Meanwhile we have the music of the thrushes.

EARTH-SHINE ON THE MOON

(Continued from page 101)

at sunrise. It is near The Sickle in Leo. a few degrees to the northwest of the first magnitude star Regulus at the end of the handle. Jupiter is more brilliant than Sirius and is easily recognized by its unflickering light, characteristic of the planets. It is also distinguished by its great brilliancy and deep yellow color.

Saturn and Mars are both in the constellation of Taurus this month. Mars was nearest to the earth at the end of last November, and it is now slowly receding and gradually decreasing in brightness. At the beginning of February it will be found a few degrees northwest of Aldebaran; both are reddish in color, but Mars is now decidedly more brilliant than Aldebaran. It will move eastward during the month until, by the first of March, it has nearly overtaken Saturn, which is some distance to the northeast of Aldebaran. Saturn moves very little during February, changing its position less than a degree. It is now almost exactly equal to Mars in brightness, but its light yellowish color contrasts strongly with the ruddy light of Mars. Saturn is now seen at its best in the telescope with its rings nearly at their widest opening.

Mercury may be seen with difficulty the first few days of the month low in the southeast in the morning twilight. Venus is now gradually drawing nearer to the sun in the morning sky, but is still high in the southeastern sky at sunrise, a brilliant Morning Star.

THE BOBOLINK

By Edna M. Crosley

To me the highlight of the spring in Maine is the return of the bobolink. On his arrival he immediately comes to a tall tree back of the house and makes his presence known. From then until the nesting season is over his cheery voice may be heard at all hours of the day. It is not easy to locate the nest of the bird, for the male bobolink is usually perched on a bean pole or bush in the field, ready to sound the alarm when I go into the garden.

Imagine the thrill I experienced last summer, while hunting field strawberries. I flushed a female bobolink and found the nest. It was cunningly hidden among the grasses and weeds directly under a small fall aster. There were three eggs in the nest, and later three more were laid. I visited the spot occasionally until the young birds were well-feathered, I think every one left the nest.

It was interesting to watch the parents when I went into the garden. They would alight nearby, with worms in mouth, to distract my attention from the youngsters in the grass. Had they remained quiet I would never have noticed them, but their nervous cries and behaviour are much like those of the robins. After some time they would drop out of sight in the grass, only to reappear at some distance. This would be repeated several times, then quietly they would slip away to feed the little ones.

Guinea Pig Pet

Writing from Nyack, New York, Dr. Dean Miltimore says that an ordinary guinea pig will make as interesting a pet as Rima, the capybara, described in our November issue. To have such a pet he recommends that it be kept in a fruit crate about two feet square, with newspapers and leaves or shavings on the floor. A shallow pan of earth should be provided for toilet purposes, and a drinking bottle acquired from a pet store. An open dish will not serve. The guinea pig should be given an empty paper bag as a sleeping bag, and will go into it when it is placed on the floor of a room after the animal has had a romp. If the crate, which should have slatted sides, is kept on a raised place the little fellow will stay there contentedly. A guinea pig will chirp like a bird when asking for food, purr when its head is scratched and otherwise make a charming and interesting pet.

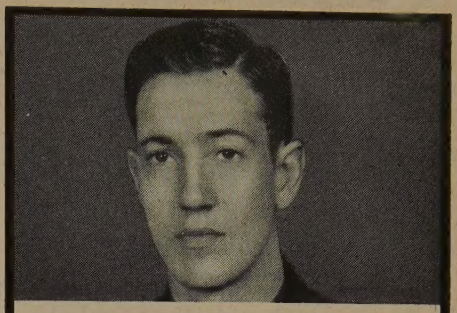
To be read before the 4TH War Loan drive

ONE DAY SOON, you will be asked to lend your Government at least an extra $100. To put at least an extra $100 into War Bonds for the 4th War Loan—$100 over and above your regular Bond buying.

If you think that getting the money is going to be hard, why, before the doorbell rings, look at the faces of these dead countrymen of yours. Read their stories.

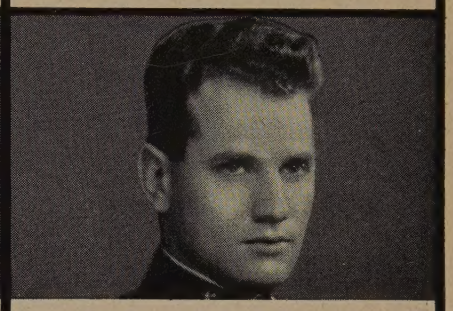
Then think how hard it would be to have to tell Americans like these that *other* Americans can't afford to lend *at least* an extra $100!

If, by chance, you should be missed—don't think your money isn't needed! Go and buy those extra Bonds, yourself!



Lieutenant William G. Farrow was one of Jimmie Doolittle's Tokio raiders. His plane made a forced landing in Japanese territory and Lieutenant Farrow is believed to be one of the American aviators who was executed by the Japanese some time later.

Rear Admiral Daniel J. Callaghan commanded the U.S.S. San Francisco. Driving his ship straight through the midst of a greatly superior Jap fleet, he directed operations from the deck of his flagship until blown to pieces by a Jap shell.



Lieutenant George H. Cannon, U.S.M.C., was mortally wounded during the Jap bombardment of Midway, Dec. 7th. He refused to be taken to a hospital till all his men had been evacuated, and as a result, he died of loss of blood.

Seaman first class James R. Ward was stationed in a gun turret in the Oklahoma on Dec. 7th. When the order was given to abandon ship, he stayed in his turret holding a flashlight so that the rest of the crew could see to escape. He was drowned.

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WAR LOAN

Keep Backing the Attack!

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Under the Microscope

By JULIAN D. CORRINGTON

DARK-FIELD MICROSCOPY

No doubt everyone has at times observed the way in which a shaft of sunlight, entering a room, illuminates cigaret smoke or dust particles in the atmosphere. Invisible elsewhere in the room, the tiny motes intercept some of the direct rays of light and reflect them to our eyes so that the particles appear as self-luminous. This is the principle of dark-field illumination, some degree of which can be employed with any form of microscope. True dark-field microscopy requires special apparatus, but what is termed the dark-field effect may be achieved without the purchase of additional devices.

For microscopes not equipped with a substage condenser, the following simple experiment will demonstrate what is meant by the dark-field effect, as well as show some of its possibilities. Use a prepared slide of some object that exhibits considerable spaced detail, such as the mosquito antenna shown in the accompanying illustrations; anything that does not present a uniform field will serve. A living culture of Euglena or Paramecium is excellent; likewise starch grains, a fresh blood smear, isolated butterfly wing scales, or a portion of a feather. With regulation transmitted light and a low-power objective, view the object as for bright-field studies, then insert a finger below the stage so as to block off the central rays of light coming from the mirror. This makes the field semi-dark and causes the object to appear lighter—that is, of greater luminosity—than the field.

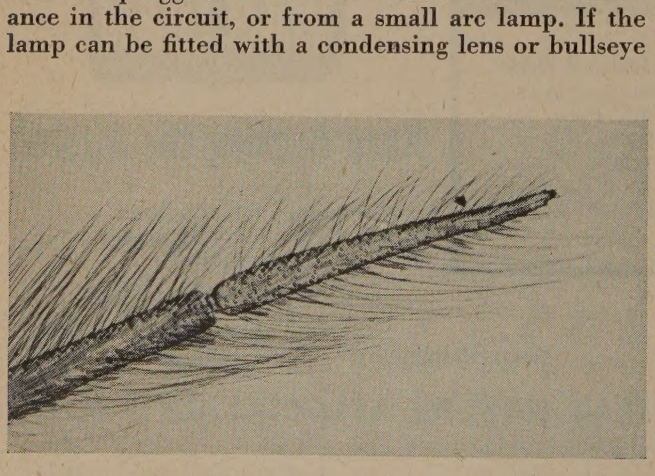
Better results along this line can be obtained by contriving to send light from below and through the object, but at such an oblique angle that none of the rays enter the objective directly, a method known as oblique illumination. One setup is to arrange a narrow beam of brilliant light from a point just below the stage and quite to one side of the optical axis, and send this upward through the object on the stage at such an angle that the beam misses the objective altogether. This may be done from any small and intense light source, such as a six-volt lamp, running on batteries or plugged in the house current with a resistance in the circuit, or from a small arc lamp. If the lamp can be fitted with a condensing lens or bullseye to narrow down the pencil of light, so much the better.

A second arrangement focuses such a beam on the concave surface of the substage mirror, which is swung far to the side and so adjusted as to reflect a narrow beam through the object but missing the objective. In either case the field should appear fairly dark, although, since stray light is almost certain to get into the objective, the full dark-field can hardly be realized. Various parts of the object will interfere with the oblique rays and many of these rays will be reflected upward through the tube to the eye of the observer. Since the source of such light, as far as the observer is able to tell, is the object itself, it is not surprising, therefore, that the object appears to glow as if self-luminous. The effect produced, as is true of all dark-field methods, is enhanced if performed at night in an otherwise dark room.

True dark-field is obtainable with any microscope having a substage condenser by using a dark-field stop. These, in several sizes, are regularly supplied with all laboratory instruments whose equipment includes a condenser, or may be purchased at nominal cost from optical manufacturers. This stop consists of a thin, black, metal disc, supported by three thin spokes to a circle of larger diameter, as in any stencil construction. When inserted below the condenser, in a slot provided for this purpose, it blocks off all central rays coming from the mirror, and converts the solid cone of light normally supplied by the condenser for bright-field microscopy, into a hollow cone, with light only around the periphery, as shown in an accompanying diagram. No light traverses the central portions of the condenser lenses. The outer rim of rays are so refracted that the object is illuminated but the rays pass off obliquely and do not enter the objective. In the diagram, dotted lines show rays intercepted by the object and reflected up through the objective to the eye, with the effect previously explained.

It is necessary to use a very concentrated light source and to shield the instrument from stray rays or light from other sources. Likewise, it is best to oil the top lens of the condenser to the slide. When properly arranged in this manner, the field should appear totally dark, the objects brilliantly illuminated.

Next in order of perfection of equipment comes the addition of a dark-field element, to replace the top lens of the regular Abbe condenser. This has its own built-in dark-field stop and is more accurate for higher powers. Lastly, instead of a refracting condenser, there are special reflecting condensers (paraboloid, cardioid) for critical work with colloidal particles, hanging-drop bacterial cultures, and other materials which, because of extremely small size, or



Mosquito antenna, bright-field illumination.

Mosquito antenna, dark-field illumination.

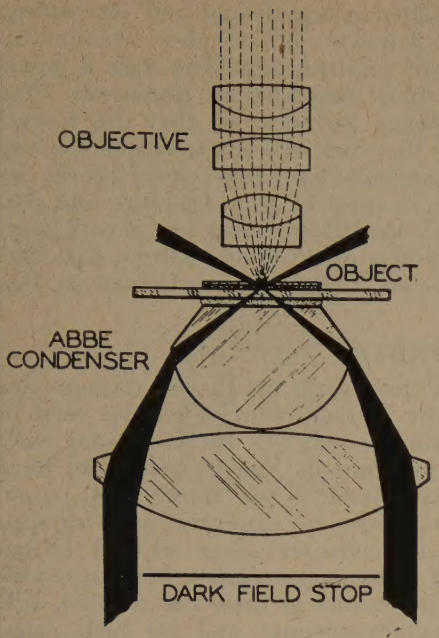


Diagram showing path of light rays in dark-field illumination.

transparency or equivalent reasons, are very difficult or even impossible to resolve in bright-field. The inexpensive dark-field stop is adequate for all ordinary purposes.

Dark-field has given information obtainable in no other way and today is considered a most valuable adjunct method.

BEGINNER'S PRIMER

Everyone is familiar with beetles, a group that includes some of man's worst economic enemies as well as certain of his benefactors. The Order Coleoptera (sheath-wings) is the largest natural assemblance of any type of organism, a fact brought out by that oft-repeated statement that there are more species of beetles than there are stars separately visible on a clear night. More than a quarter of a million species have, in fact, been described; yet in spite of this vast number, the order is a compact one, any beetle being readily identified as such.

A beetle is an insect equipped with chewing mouthparts, not very different from the primitive ones seen in a grasshopper; with two pairs of wings, of which the first pair are thickened and hardened into wing-covers termed elytra (sing., elytron) that meet in the middle line down the back, protecting the second pair, which are membraneous and fold lengthwise into plaits, like a fan, as well as crosswise when at rest; and with a complete metamorphosis (Holometabola).

In a few beetles the hind wings have been lost and the elytra fused together; in a few others both pairs are wanting. Only earwigs, among other insects, possess elytra, and earwigs have a forceps or pincer-like pair of appendages which beetles lack, at the hind end of the body. Beetle elytra have no veins and are functionless in flight. They usually cover the abdomen completely, protecting both wings and body, but in the rove beetles and some others, these wing-covers are short, exposing part of the abdomen. The coxa, or basal segment, of the hind leg is immovably fused with the thorax and does not appear at first glance to form a part of the appendage at all. The greatest diversity of antennal types is exhibited by various families of beetles. See this department for May, 1941.

The larvae of beetles are termed grubs. Generally they have three pairs of jointed legs, with sometimes a single caudal proleg. Most familiar is the curved, fat, white grub found in the soil or decaying wood, and constituting the standard example of a larval type, the scarabæiform, taking this name from the Family Scarabæidae, which includes the tumble-bugs, June-bugs, and many others. Beetle pupae are designated as exarate, having the wings and legs free. The last larval instar often makes a crude variety of cocoon out of cemented earth or sticks, while a few beetle pupae transform inside the last larval skin.

The number of families is very large—154—so that no listing is possible in a brief account. Some characteristic and familiar representatives include the tiger, ground, diving, whirligig, water-scavenger, carrion, rove, blister, click, dermestid, lady-bird, stag, long-horned, leaf, and flea beetles, lightning and potato "bugs," scarabæids, and weevils. They range in size from nearly microscopic to the relatively huge rhinoceros beetles, up to six inches in length and heavy-bodied. As to habits, there are aquatic, terrestrial, burrowing, and arboreal types; carnivores, herbivores, scavengers, and parasites; economically beneficial, as the predaceous tiger or lady-bird beetles, or the medicinally valuable blister beetles, and highly destructive species, as the Colorado potato beetle, elm-leaf beetle, or cotton-boll weevil.

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better. Elytra are popular, especially those of the diamond beetles, made as opaque mounts for use with reflected light. Collections of antennal types are highly interesting and instructive, likewise slides of legs, wings, and mouthparts. For example, weevils have elbowed (geniculate) antennae borne on a curiously developed snout that is a modified prolongation of the head, with mouthparts at its tip; diving beetles have suckers on the forelegs used in reproduction and long swimming hairs on the hind legs; and the larva of *Passalus*, horned or wood-boring beetles, has the third leg dwarfed and modified into a stridulating (sound-producing) apparatus. There is no end to beetle study, whether pursued from the standpoint of economic entomology, classification, ecology, microscopy, or the mere collecting of pinned specimens.

TRADE NOTES

For the geologically-minded reader who has already passed his novitiate, we recommend *Geomorphology*, by O. D. von Engeln, an attractively-written, scholarly, and beautifully-illustrated new work. This science, the anatomy of the earth's surface, studies "existing conditions, as expressed in the relief of the lands, (and) the form and distribution of the continents and oceans, . . . which must be mastered before the geologic past can be understood." As the college course in comparative anatomy is to general zoology, in the biological field, so geomorphology is to general geology. Both are descriptive anatomy plus the illuminating and explanatory concept of evolution. The geomorphologist studies all aspects of science dealing with the surface configuration of the solid earth and explains present-day structure and process in terms of those of the past.

After introductory discussions of the earth as a whole, literature, contrasts between the Davis (American) and Penck (German) schools of interpretation, processes, stages, and cycles of change of the earth's surface features, the carefully-documented chapters deal successively with stream and valley cycles on a coastal plain, on an old land, in dome and fold structures, interruptions to the normal cycle, rock strength, weathering, movement, history of the folded Appalachians, fault-block mountains, desert, glacial, and coastal cycles, coral reefs, karst topography, and land forms from volcanicity. The author is past master at explanatory writing in this field and has selected a splendid and varied assortment of illustrations. Pp. xxii, 655; colored frontispiece, plts. VII, figs. 372. The Macmillan Co., 60 Fifth Ave., New York, 1942. $4.50.

Meteorology is heavily stressed by all combatants in the present world conflict, and so a new addition to popular literature on the subject, especially when contributed by an outstanding authority of long experience, is timely and welcome. *Ways of the Weather*, by Dr. W J. Humphreys, is nontechnical without losing scientific merit, readable by anyone, complete, recent, accurate. After struggling through an involved and unnecessary first chapter on weather perceptions, the author gets on with the business of explaining how weather factors are measured, and considers the origin and composition of the atmosphere, the distribution of temperature, water vapor and pressure, winds, precipitation, electricity, optics, climate, weather control, and history of the science. The interlude on weather music and the chapter on practical uses of meteorological science we found especially well done and enjoyable.

The book is highly informational and interesting, which is its main purpose; nevertheless, certain features are capable of improvement. The style is amazingly varied; at times anecdotal or humorous, then again prosaic or even pedantic, so that the several parts hardly seem the work of a single writer. Certain explanatory comparisons are very clear, others involved and badly in need of line drawings and diagrams. In general, the illustrations are satisfactory, but far too scanty in a work of this nature. Pp. 400; figs. 75. The Jacques Cattell Press, Lancaster, Pa., 1942. $4.00.

SIMPLE MICROMETRY

Micrometers, as the term is used in microscopy, are instruments for the measurement of objects seen in the field of the microscope. The art of making such measurements is micrometry, and its principles have previously been explained, in our March, 1941, issue. Professional micrometers are expensive and, for serious use, require a mechanical stage as well. Oftentimes a rough and ready measurement, without equipment and at a great saving in time and trouble, will answer the immediate purpose, and for such cases, nothing is better than the following method.

Cut out a one-half-inch square from one of the half-tone illustrations in NATURE MAGAZINE, dip it in xylene for five minutes, then place on the center of a clean blank slide. Keep it moist by adding an occasional drop of xylene while in use. The ruled lines seen when examining this piece of paper through the microscope run 110 to the inch and permit of two forms of measurements.

If the material to be measured can be strewn over the paper, as is true of diatoms, sand grains, forams, pollen, seeds, insect eggs and parts, fibers, protozoa, and many other subjects, a direct reading may be made and calculations with reasonable accuracy to one-quarter of a division (440 divisions to the inch) readily performed. If living material is used, immerse the paper in water instead of xylene, even though this cuts down the translucence of the paper.

If the object is a section or otherwise impossible to measure by the above method, the paper may be affixed to the bottom of the slide, usually with a fair degree of success, depending on how well the lines show through. Constant shift of focus from lines to object is necessary but not troublesome. Finally, if this fails, the blank field of the microscope may be measured with the screen lines, then the micrometer slide removed and the object slide mounted in its place, when some approximation of the amount of the field covered by the object can be estimated. This last scheme is far less accurate than the others, but even so provides a measurement that is much better than none at all.

Lighting will depend on the subject. All of the above descriptions presuppose the regulation transmitted light. If results are not satisfactory, however, try reflected light, from above, or a combination of both.

As many readers know, photographs for reproduction are rephotographed on a copper plate through a fine screen, which breaks the continuous picture into series of dots, of varying intensity of light. When the plate is etched and then printed, the screening is also reproduced, but is not visible to the naked eye on account of its fineness. The dots appear to run together again to form a continuous picture, but even low magnification suffices to reveal the true state of affairs. Screen sizes differ; consequently do not use halftones from other sources without first ascertaining the mesh of screen employed.